GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION
SPONSORED PROJECT INITIATION

No action add'l OH

Date: August 17, 1977

Project Title: The Feasibility of Manufactured Food Products Machinery, Farm Machinery and Equipment, or Paper Industries Machinery in Southwest Georgia

Project No: A-2017

Project Director: T. I. Chiang

Sponsor: S.W. Ga. Area Planning & Development Commission

Agreement Period: From 6/22/77 Until 6/21/78

Type Agreement: Std. Ind. Res. Agreement, as amended

Amount: $48,000

Reports Required: Quarterly Progress Reports; Final Technical Reports

Sponsor Contact Person (s):

Technical Matters

Mr. Wayne Williams
S.W. Ga. Planning & Dev. Comm.
P.O. Box 346
Camilla, Ga. 31730

Contractual Matters
(thru OCA)

Defense Priority Rating: None

Assigned to: Technology & Development Laboratory (School/Laboratory)

COPIES TO:

- Project Director
- Division Chief (EES)
- School/Laboratory Director
- Dean/Director—EES
- Accounting Office
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- Reports Coordinator (OCA)
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- Office of Computing Services
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- Project Code (GTRI)
- Other _____

CA—3 (3/76)

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION

no action 10/25 OHL

Date: 10/20/78

Project Title: The Feasibility of Manufactured Food Products Machinery, Farm Machinery and Equipment, or Paper Industries Machinery in Southwest Georgia

Project No: A-2017

Project Director: T. I. Chiang

Sponsor: S. W. Ga. Area Planning & Development Commission

Effective Termination Date: 10/9/78

Clearance of Accounting Charges: 10/31/78

Grant/Contract Closeout Actions Remaining:

_X_ Final Invoice ~~and Closing Documents~~XXXXXXXXXXXXXXXXXXXX

_ Final Fiscal Report

_ Final Report of Inventions

_ Govt. Property Inventory & Related Certificate

_ Classified Material Certificate

_ Other _____

Assigned to: Technology & Development (School/Laboratory)

COPIES TO:

Project Director
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Office of Computing Services
Director, Physical Plant
EES Information Office
Project File (OCA)
Project Code (GTRI)
Other _____

CA--4 (3/76)

Project No. A-2017
Contract No. 10740070

FEASIBILITY STUDY ON FOOD PRODUCTS MACHINERY AND FOOD SERVICE EQUIPMENT

Quarterly Progress Report to /
Southwest Georgia Area
and
Planning Development Commission
June 22, to September 8, 1977

ECONOMIC DEVELOPMENT DIVISION
TECHNOLOGY AND DEVELOPMENT LABORATORY
ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY
SEPTEMBER 3, 1977

JOBS COMPLETED OR IN PROGRESS

1. Product Screening

A screening matrix on farm machinery and equipment, food products machinery, paper industry machinery and food service equipment was developed and carried out. As a result, food products machinery and food service equipment are the two final choices of this research project. Two copies of the screening matrix were submitted for approval on August 3, 1977. We received a massage from Mr. Wayne Williams, Southwest Georgia APDC, that verbal approval was given by the Coastal Plains Commission to go ahead with in-depth study on these two industries.

2. Literature Search

A literature search has been conducted encompassing the publication sources of governments, private companies, journals, and periodicals. Some publications have been obtained. However, a computerized literature search reveals no useful publication so far. It may indicate the paucity of published materials in the study areas. On the other hand, the results of this research program may provide an important source of information to the two chosen industries.

3. Interviews

Numerous interviews were carried out either by phone calls or in person. Important information and data were obtained. Several agencies are given here as examples - Food Processing Machinery and Supplies Association, National Association of Food Equipment Manufacturers, U. S. Department of Commerce, U. S. Department of Agriculture, Institutions, Technomicf, Bepex, etc.

4. Mail Surveys

Two mail surveys are currently underway - one on food products machinery and one on food service equipment. The first mailing was completed on August 6, 1977, totaling 352 questionnaires being sent to food products machinery producers and 376 questionnaires being sent to food service equipment producers. Responses are continuing to come in. The purposes of the surveys are given as follows:

- o To find out companies with plans for expansion in the next five years and their interest in this research program.
- o To find out requirements of raw materials, utilities, labor, and outside supportive services related to specific product manufacturing.
- o To identify cooperating companies for further consultation.

(See attached survey questionnaire and cover letter.)

5. Location and Site Study

Plans were made to collect detailed locational data on Albany, Thomasville, Moultrie, and Bainbridge - the four major cities within the Southwest Georgia APDC area. Data will be collected on industrial sites, labor, wages, material supplies, supportive services, transportation, and taxes, etc. One of the four cities will be used as the anchor point in later production-investment studies.

6. Market Potential Study

Sustantial information and data on the market potentials of the two chosen industries are at hand. Analysis of market data will be centered on historical trends, breakdowns by end uses, and the regional market of the Southeast.

7. Production and Investment Requirements

Food Products Machinery and Food Service Equipment include hundreds of kinds of machinery and equipment. No individual manufacturer produces the whole range of products within the given industry. For practical purposes, we have to decide on a specific line of product or products for a detailed study on production-investment requirements for each of the two chosen industries. The review of survey returns and the information at hand will help to select two product lines for the production-investment studies.

8. In-Kind Services

According to the contract agreement, the Southwest Georgia APDC will provide in-kind services equivalent to $10,000 to this research program. From the beginning of this study, the staff of the Southwest Georgia APDC have been given the task of collecting locational and site data in their area. The mailing of two surveys was performed by them as well.

WORK PLANNED FOR NEXT QUARTER

1. A second mailing of questionnaires will be sent to non-responding companies after a three-week lapse of the first mailing. A cut-off date on survey returns will be set. All survey returns will be carefully reviewed for useful information. Cooperating companies will be interviewed by phone calls for further consultation. A few cooperating companies, with desired product lines and with a plan for future expansion, will be visited in person for in-depth investigation on their production-investment requirements.

2. Plans will be made to collect data on out-of-state competing locations once these locations are specified.

3. Market data will be analyzed according to plans. Further search for additional data will be made.

4. Great efforts will be made to obtain information on specific types of material supplies, supportive services, skilled labor, labor union conditions, taxes, industrial sites, etc., in southwest Georgia through the cooperation of the Southwest Georgia APDC.

5. Plans will be made to collect freight-rate data needed for transportation analysis.

ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

The Economic Development Division (EDD)* has been commissioned to conduct a feasibility study on the establishing of new food products machinery/food service equipment manufacturing in Southwest Georgia by the Southwest Georgia Area Planning and Development Commission. This study will contain a comprehensive analysis of markets, transportation costs, and a comparison of production and investment costs among major manufacturing locations in the nation vs.a potential plant site in Southwest Georgia.

If your company is interested in our program or has a plan for future expansion, please complete the enclosed questionnaire and return it to us. From the inputs of responding companies, we will know what types of end products, raw materials, labor, and supportive services should be carefully examined in our study.

If you decide to cooperate with us by providing needed information in the questionnaire, a copy of the study results will be made available to you when it is completed. However, if you have no interest in this study program, please just return the blank questionnaire to us.

All your answers, according to our established policy, will be kept in strict confidence. Because of time limit given for this research study, we would appreciate your prompt response. Enclosed is a self-addressed and stamped envelope for your returning of our questionnaire.

Sincerely,

[redacted]

Dr. Tze I. Chiang
Principle Research Scientist

*EDD is a non-profit research oriented organization and it is a part of the Engineering Experiment Station, Georgia Institute of Technology. The Station has 300 full-time scientific, technical, and administrative personnel, covering the spectrum of applied science, engineering, economics, operations research, and systems analysis.

Economic Development Division
Technology and Development Laboratory
Engineering Experiment Station
Georgia Institute of Technology

QUESTIONNAIRE

1. Company name: _____

2. Address: _____

3. Is your company interested in our study program? Yes ____ No _____

4. Do you anticipate an expansion of your manufacturing facilities in the next five years? Yes _____ No _____

5. What are the major types of end products produced by your company?

   _____ _____

   _____ _____

6. Current plant location(s): _____

   _____ _____

7. Is the southeastern part of the United States an important marketing area to your company? Yes _____ No _____

8. Major types of materials purchased (as specific as possible):

   _____ _____

   _____ _____

   _____ _____

9. Major outside supportive services (such as stamping, forging, coating, etc.) needed in your manufacturing:

   _____ _____

   _____ _____

10. Please name specific type of labor required:

Non-Skilled	Skilled
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

(OVER)

Questionnaire

11. Major modes of transportation used by your company.

    a. For ship-in of raw materials:

    Trucks _____% of shipments; average distance _____ miles.
    Railroad _____% of shipments; average distance _____ miles.

    b. For ship-out of end products:

    Trucks _____% of shipments; average distance _____ miles
    Railroad _____% of shipments; average distance _____ miles

12. Utilities which would be needed in your manufacturing, based on rough estimates:

    Electricity _____ kwh per month

    Natural gas _____ therms per month

    Fuel oils _____ gallons per month

    Water _____ gallons per month

13. Could we contact you for further consultation? Yes _____ No _____

14. Comments or suggestions if any?

_____

_____

_____

_____

Name _____

Position _____

Telephone _____

Date _____

Project No. A-2017
Contract No. 10740070

FEASIBILITY STUDY ON FOOD PRODUCTS MACHINERY AND FOOD SERVICE EQUIPMENT

Quarterly Progress Report to 2
Southwest Georgia Area
and
Planning and Development Commission
September 9 to December 31, 1977

Economic Development Division
Technology and Development Laboratory
Engineering Experiment Station
Georgia Institute of Technology
December 23, 1977

TASKS COMPLETED OR IN PROGRESS

1. Mail Surveys

Two mail surveys were completed -- one on food products machinery manufacturers and one on food service equipment manufacturers. The results of these two surveys are given below:

	Food Products Machinery	Food Service Equipment
- Number of questionnaires delivered	352	376
- Number of responses received	173	148
- Rate of responses	49%	39%
- Completed questionnaires with useful information	59	44
- Responding companies having plans for expansion in the next five years	49	35

Based on the two survey returns, data were tabulated according to the following categories:

- Major end products vs. materials purchased.
- Major end products vs. outside supportive services needed.
- Major end products vs. type of labor required.
- Mode of transportation and average distance.

2. Screening and Selecting Companies

One of the major objectives of this study program is to compare the costs of capital investment and the costs of production among competing locations in the nation on certain types of food machinery and equipment manufacturers (including at least one location in southwest Georgia). For practical purposes, survey responding companies were screened to select those companies which could provide needed information for the project. Three criteria were used in the screening process. They were (1) a plan for expansion in the next five years, (2) an interest in southwest Georgia as a potential location for expansion, and (3) the capacity to provide detailed data on a model plant.

Through contacts and on-site interviews with 20 cooperating companies at the 1977 National Association of Food Equipment Manufacturers Exhibition in New Orleans, seven companies were selected for further consultation. Only two

companies have been able to cooperate with the project on detailed investment requirements and production costs. Ideally, one is manufacturing food processing machinery while the other is engaged in the production of food service equipment.

3. Potential Plant Locations in Southwest Georgia

Four locations have been chosen to represent the southwest Georgia area. They are Albany, Bainbridge, Moultrie, and Thomasville. Many additional locations in the area can be added to the list. However, due to various constraints of the study, only these four locations are being given. Data related to these four locations on labor availability, wage rate, labor conditions, utility rates, tax rates, plant sites, transportation, educational facilities, etc., have been collected and analyzed.

4. Availability of Material Supplies and Outside Supportive Services

The sources of material supplies and outside supportive services to food machinery and equipment manufacturers in Alabama, Georgia, and Florida have been identified, tabulated, and placed on maps. These supplies and services include steel mills, metal service centers, job shops, iron and steel foundries and castings, nonferrous castings, forgings, stampings, electroplating, plating, polishing, anodizing, coating, and engraving.

5. Economic Bases in the Southeast

The economic progress in the Southeast relative to the nation has been a significant factor in generating new industrial growth in the region. Data concerning the historical trends of population, employment, personal income, per capita personal income, savings, wholesale trade, retail trade, value added by manufacture, expenditures for new plants and equipment, installed capacity of electrical utilities, registration of new vehicles, etc., have been collected, analyzed, and tabulated. The southeastern states included in this study are Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee.

6. Comparative Costs of Investment and Production

A model production is set up separately for food products machinery and for food service equipment. Each model production will use three different

locations in gathering various cost data. The choice of locations is based on the recommendation of the two cooperating companies mentioned previously. The locations chosen for the food products machinery model will be Albany, Georgia; Orlando, Florida; and Chicago, Illinois. This model would produce pasteurizers, spin coolers, and other food processing machinery. The locations for the food service equipment model will be Albany, Georgia; South Bend, Indiana; and Philadelphia, Pennsylvania. This model would produce ranges, convection ovens, broilers, and fryers.

Detailed data on investment requirements such as land, building, machinery, and on production inputs such as labor, raw materials, and utilities are in the process of investigation. The two cooperating companies have been providing useful information or guidelines for collecting needed data. The purpose of this sectional study is to provide a comparison of costs on investment and production inputs among the chosen locations.

7. Markets and Marketing

Two separate investigations on the markets and marketing of the food products machinery industry and the food service equipment industry have been conducted simultaneously. The investigations emphasize the volume or size of respective national markets, future projections, marketing outlets, southeastern regional markets, marketing characteristics, and statistical inferences. Large quantities of data are at hand waiting to be analyzed.

8. In-Kind Services

The personnel of the Southwest Georgia Area Planning and Development Commission has been collecting information on labor, taxes, plant sites, utility rates, and other location data related to the four representative locations in southwest Georgia.

TASKS PLANNED FOR NEXT QUARTER

1. Continuing efforts will be made to gather data related to investment requirements and production costs based on two model productions and three locations for each model.

2. The investigations on the markets and marketing will be continued. Data gathering and analysis should be completed by the end of next quarter.

3. A transportation analysis concerning freight-out costs to different destinations based on three locations is planned.

4. Data collection on the four representative locations in southwest Georgia should be completed next quarter. Tables or forms of presentation should also be finalized.

Project No. A-2017
Contract No. 10740070

FEASIBILITY STUDY ON FOOD PRODUCTS MACHINERY AND FOOD SERVICE EQUIPMENT

Quarterly Progress Report to 3
Southwest Georgia Area
and
Planning and Development Commission
January 1 to March 31, 1978

GEORGIA INSTITUTE OF TECHNOLOGY
ENGINEERING EXPERIMENT STATION
Technology & Development Laboratory
Economic Development Division
Atlanta, Georgia 30332
March 24, 1978

TASKS COMPLETED OR IN PROCESS

1. Preparing a Draft Report on Food Service Equipment

Since this research project consists of two final reports dealing with food service equipment and food products machinery respectively, it was decided to complete them one-at-a-time. A final draft report (on food service equipment) has been prepared. It is expected that the draft report will be completed within a few weeks.

2. Final Review and Analysis of Data on Food Products Machinery

A large body of data concerning markets and marketing, transportation costs, factors affecting Southwest Georgia as a location for food products machinery manufacturing, and various input-output relationships on a model production, have been collected and analyzed. The process of transforming these data into tables, graphs, and maps for presentation purposes is in progress.

TASKS PLANNED FOR NEXT QUARTER

1. Completing Final Reports

Final draft reports will be completed on both food service equipment and on food products machinery. Tables, graphs, and maps will be completed. Manuscripts will be prepared and typed.

2. Reviewing Final Draft Reports

When the two final draft reports are completed, they will be sent to cooperating companies for review and to the Southwest Georgia Area Planning and Development Commission for approval.

Project A-2017

THE FEASIBILITY OF MANUFACTURING FOOD SERVICE EQUIPMENT IN SOUTHWEST GEORGIA

Prepared for

The Southwest Georgia Area
Planning and Development Commission

Under Partial Funding Provided by

The Coastal Plains Regional Commission

by

Tze I. Chiang
Project Director
and
Principal Research Scientist

GEORGIA INSTITUTE OF TECHNOLOGY
Engineering Experiment Station
Technology and Development Laboratory
Economic Development Division
Atlanta, Georgia 30332
April 1978

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Acknowledgments

During the course of this program, which continued for a year, so many people contributed their time, experience, and knowledge to make the program possible and to make this study worthy that it would be impossible to mention all persons and institutions involved. Consequently, only the most significant assistance is mentioned here.

The Southwest Georgia Area Planning and Development Commission (SGAPDC) provided staff time, aside from that funded by the research grant they received from the Coastal Plains Regional Commission. Mr. Wayne Williams and his associates (SGAPDC) were most helpful in collecting locational data in the commission area.

Three gentlemen involved in the food service equipment industry were most cooperative in providing materials and consultation: Mr. John C. Hofer, Principal Associate, Technomic Consultants; Mr. Ed Karlins, Director of Market Research, Institutions; and Mr. William C. Carpenter, Executive Secretary, National Association of Food Equipment Manufacturers.

Frequent consultations also took place with two local equipment dealers: Mr. George W. Pratt, Jr., Bill McCoy Associates; and Mr. Jerry Moore, Sales Manager of Dromedary Company.

Some information on costs relating to land, building, materials, and utilities were supplied by Mr. Brian Baccus, Lawyers Title Insurance Company; Mr. W. H. Kubler, Georgia Power Company; Mr. David Cox, F. W. Dodge Company; Mr. Walter Rodemann, General Manager of the Albany Water, Gas, and Light Commission; Mr. Bill Bullard and Mr. H. W. Lay of Atlantic Steel Company; and J. M. Tull Metals Company.

Various publications and statistics were obtained from government sources. The following Bureau of the Census personnel provided needed data: Mr. Ted J. McGrath, Machinery Section Chief; Mr. Robert Russell and Mr. Conred Alexander, Retail Trade Division; and Mr. Robert Schiedel, County Business Section. Mr. Michael G. Van Dress, Agricultural Economist, National Economic Analysis Division, U. S. Department of Agriculture, provided a copy of his paper concerning the market for food away from home. Mrs. Joyce A. Morris, Labor Market Specialist, Georgia Labor Department, made available a large volume of

publications. The Georgia Department of Industry and Trade supplied materials concerning plant locations, wage rates, financial assistance for new industries, and labor training programs in Georgia.

Last but not the least, the author is indebted to a vice president in charge of engineering with a major food service equipment corporation for his tireless assistance in providing detailed data for the model production. He is also grateful to the 44 food service equipment manufacturers across the nation who responded enthusiastically to the survey conducted for this study.

Summary

The marketing sales of food service equipment in the United States increased from $1,714 million in 1975 to $2,109 million in 1977, a 10.9% annual growth rate. In this report, marketing sales refer to sales made by distributors or agents. The sales were projected at $4,768 million (in current dollars) by 1985, a 10.7% annual growth rate. The growth of the food service equipment marketing sales has been parallel with the increases in the retail sales of eating and drinking places (the food service industry) in the nation. The increasing trend toward eating-out has sustained the continuing growth of the food service industry, and, thus, food service equipment marketing sales.

In a seven-state regional market of the Southeast, consisting of Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee, the sales for food service equipment were estimated at $250 million in 1976 and were projected to be $782 million by 1985, a 13.5% annual growth rate. This seven-state market constituted 12.95% of the sales of food service equipment in the nation in 1976, and it was projected to be 16.4% of the national market by 1985. The larger market increase in the seven-state region reflects the continued growth trends in population and other economic activities in this region as compared to the nation as a whole.

There were 345 food service equipment plants in the nation in 1977. However, only 29 of these plants were located in the seven-state region, or about 8% of the nation's total. In light of the projected sales figures for 1985 and because of the small number of plants in the region, there should be a need for new food service equipment plants to be built in Southwest Georgia.

Southwest Georgia has distinctive advantages as a location for the food service equipment manufacturer. The major advantages are summarized below:

- o Labor productivity and dependability - Labor productivity in the area is one of the highest in the nation as reflected by the value added per dollar of total payroll cost. Average percent of working time lost in a given area reflects labor dependability, and working time lost in the area is among the lowest.
- o Wages - The average wage rates in the area are substantially lower than northern industrial states and relatively lower than some neighboring states.

- o Material supplies and supportive services - Nearly all materials and supportive services needed in the food service equipment industry can be obtained in Georgia or from neighboring states.
- o Taxes - Tax rates are substantially lower in Southwest Georgia than northern industrial states and are relatively lower than other locations in Georgia and neighboring states.
- o Accessibility to markets - Compared with most northern locations, Southwest Georgia has a clear freight advantage over other southern states and over some southwestern states. However, the higher freight rates to northern, midwestern, and Pacific states can be absorbed by substantial savings in production costs in the area.
- o Financial assistance and training programs - Georgia offers a variety of industrial financing and employee training programs for new industries.
- o Gentle climate - The area has a gentle climate throughout the year. This is a definite advantage in view of the hardships encountered in northern locations during winter months.

A case study of a model production, which was designed to produce ranges, ovens, and steam kettles, was conducted to determine the differences in investment requirements, production costs, and projected returns between Albany, Georgia (a Southwest Georgia location), and a Great Lakes location. Major findings are given as follows:

Item	Albany, Georgia	A Great Lakes Location
Units produced/year	18,674	18,674
Land	11 acres	11 acres
Building space	125,918 sq. ft.	125,918 sq. ft.
Number of workers	134	134
Administrative personnel	25	25
Fixed capital investment	$3,121,473	$3,787,050
Working capital	$2,952,000	$3,000,000
Material costs/year	$2,563,434	$2,651,562
Wages and benefits/year	$1,713,920	$2,401,647
Total production costs/year	$5,876,113	$6,984,826
Gross sales/year	$9,168,818	$9,168,818
Net sales/year	$8,251,936	$8,251,936
Net profit before taxes	$2,375,823	$1,267,110
Net profit after taxes	$1,092,879	$ 582,870
Net profit before taxes/net sales	28.8%	15.4%
Percent return on fixed investment	35%	15%
Payout period	3 years	6.5 years

INTRODUCTION

Purpose of Study

In recent decades the economic growth of the Sun Belt has provided opportunities for southern communities to attract new industrial plants into their area. However, plant location decisions are complex and must relate the supply, market, and other requirements of the manufacturing process to the resources and attributes of a particular candidate area. For this reason, the Southwest Georgia Planning and Development Commission asked the Economic Development Division of Georgia Tech to undertake an objective evaluation of two desirable industries -- food service equipment and food products machinery -- to determine the feasibility of establishing these two types of manufacturing in Southwest Georgia. This report treats only the food service equipment industry. A separate study will deal with the food products machinery industry.

The Southwest Georgia Area Planning and Development Commission will use this research in its selective development efforts as a tool to attract potential investors to Southwest Georgia. Map 1 shows the 14-county area comprising the Southwest Georgia Planning and Development Commission.

Objectives and Methodology

The main objectives of this research are given as follows:

1. To determine the production requirements of the food service equipment industry in terms of labor, material supplies, fuel and utilities and their availability in the Southwest Georgia area.
2. To study the markets and marketing practices of the industry.
3. To provide a freight analysis based on selected locations.
4. To compare the relative costs of investment and production between a Southwest Georgia location and an out-of-state location.

In order to satisfy the research objectives mentioned above, four tasks were completed. (See Figure 1.) Methods or approaches used in accomplishing these tasks are summarized here.

The first task assessed the manufacturing requirements of the industry. A nationwide survey of food service equipment manufacturers was conducted at the

Map 1

FOURTEEN-COUNTY SOUTHWEST GEORGIA PLANNING
AND DEVELOPMENT COMMISSION AREA

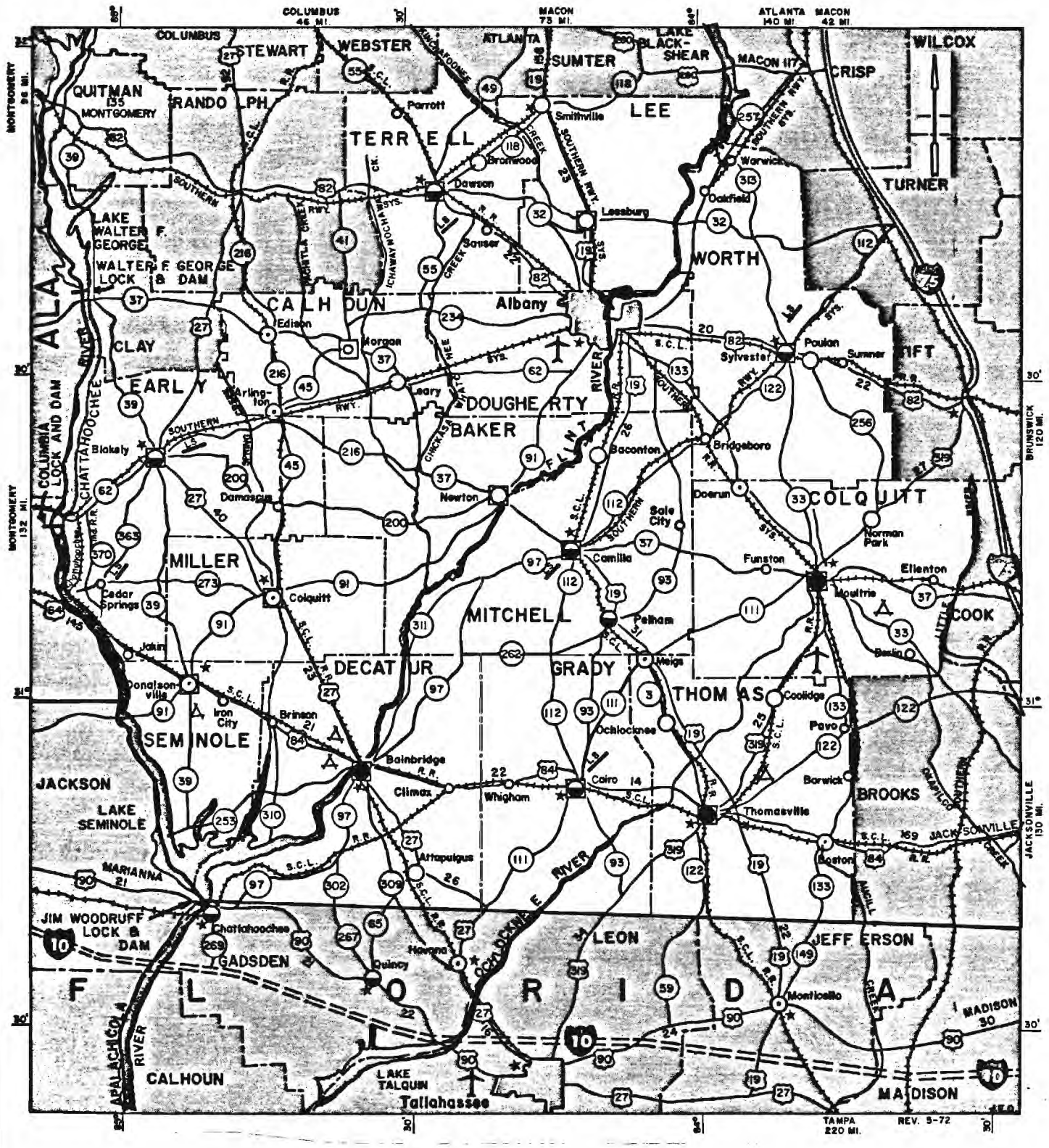
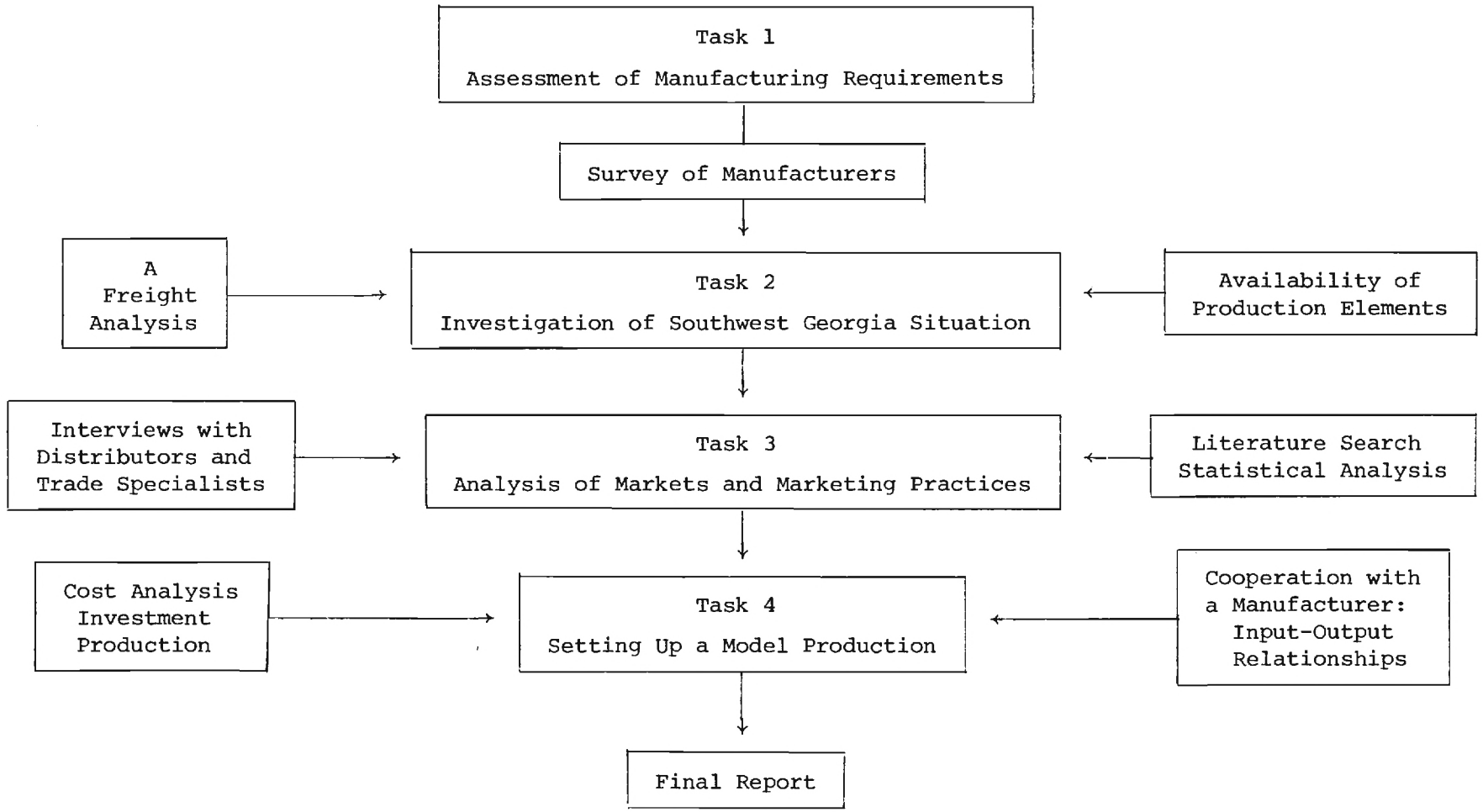


Figure 1

FLOW OF RESEARCH METHODOLOGY



beginning of this research project to determine (1) the end products involved, (2) the requirements of production elements, and (3) the intention of the manufacturers concerning their future expansion.

The second task investigated the availability of the production elements such as labor, materials and supplies, and power and fuels in Southwest Georgia. Other factors considered were the economic growth of the region, labor productivity and dependability, accessibility to markets, potential plant sites, and industrial financing and training programs.

The third task dealt with the analysis of markets and marketing practices. Published statistical data on food service equipment shipment value was correlated with eating and drinking retail sales and gross national product. Future trends based on these statistical series were projected, and the regional market of the Southeast was determined. Interviews with manufacturers, distributors, and trade specialists were conducted to learn about marketing practices.

The fourth task consisted of setting up a model production based on specific types of food service equipment. Through cooperation with a major manufacturer, a model plant scale with specific end products as well as the input-output relationships of various production elements was obtained. Cost data on these production elements were collected, analyzed, and compared for two locations. Potential returns on the model production were estimated.

Organization of the Report

There are three major sections in this report. Section I covers the markets for food service equipment in the United States. All markets and marketing practices related to the food service equipment industry are described and analyzed. Section II presents the Southwest Georgia area as a location for the manufacture of food service equipment. Locational factors such as economic growth, material supplies, labor availability and dependability, wage rates, transportation, utilities, potential plant sites, and industrial financing and training programs are scrutinized. Section III contrasts a model food service equipment production in Southwest Georgia with a northern location in terms of investment requirements, production costs, and projected returns.

THE MARKETS FOR FOOD SERVICE EQUIPMENT

National Trends

The food service equipment industry can be defined as the manufacture and distribution of equipment and supplies for preparing, storing, and serving food in restaurants, cafeterias, hotels, hospitals, clubs, drugstores, schools, institutions, or wherever food and drinks are served away from home.

The food service equipment industry is one of the major industries in the nation. The importance of this industry to the national economy can be illustrated by its annual sales of over $2 billion and its healthy growth rate of 10.8% a year (based on current dollars). This substantial growth is reflected in the population, in gross national product (GNP), and in the retail sales of eating and drinking places. Two statistical correlations were used as the cornerstone for projecting the future sales of food service equipment and also as the base for determining the regional marketing value of the industry. These two correlations are (1) GNP as compared to retail sales of eating and drinking places and (2) retail sales of eating and drinking places as compared to value of shipments on commercial cooking and food warming equipment.

The value of GNP and the retail sales of eating and drinking places in the United States from 1958 to 1976 are given in Table 1 and also in Figure 2. The statistical correlationship between these two series was established and their estimating equation is presented in the same table. Based on the Wharton Economic Forecast on GNP (current value), the retail sales of eating and drinking places were projected to 1977, 1978, 1980, and 1985. These retail sales showed an annual growth rate of 7.8% between 1958 and 1976 and were projected to have a 8.7% growth annually between 1977 and 1985, on current dollar basis.

A second statistical correlation between the retail sales of eating and drinking places and the product shipments of commercial cooking and food warming equipment (SIC 35891) was established. Commercial cooking and food warming equipment represent only a fraction, about 17% to 18%, of the shipments of the whole food service equipment industry. The commercial cooking and food warming equipment segment of the industry was used in this correlation analysis because it is the only statistical series available on an historical basis. The detailed data and an estimating equation are presented in Table 2. These two data series are given also in Figure 3 to illustrate their visual relationship. The product

Table 1

GROSS NATIONAL PRODUCT AND RETAIL SALES
OF EATING AND DRINKING PLACES IN THE UNITED STATES,
1958-1976 AND PROJECTION
(in billions of dollars)

Year	Gross National Product[1/]	Retail Sales of Eating and Drinking Places[2/]
1958	444.5	14.8
1958	482.7	16.0
1960	503.7	16.5
1961	520.1	16.8
1962	560.3	17.1
1963	590.5	18.6
1964	632.4	19.7
1965	684.9	21.7
1966	749.9	23.8
1967	793.9	25.2
1968	864.2	27.1
1969	930.3	26.3
1970	977.1	26.4
1971	1,054.9	29.4
1972	1,158.0	33.6
1973	1,306.5	45.2
1974	1,412.9	47.0
1975	1,528.8	51.8
1976	1,706.5	56.8
1977	1,890.3*	61.2**
1978	2,092.4*	67.9**
1980	2,542.9*	82.8**
1985	3,950.3*	129.5**

* Based on Wharton Economic Forecast, current dollars.

** Linear correlation between gross national product (X) and eating and drinking places' retail sales (Y):
Estimating equation: $Y = -1.49 + (3.32 \times 10^{-2}X)$
Coefficient of correlation : $R = 0.9868$
Standard error of estimate: $S = \$5.47$ billion

Sources: 1/ U. S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, 1958-76. (Based on current dollars.)

2/ Survey of Buying Power, 1959-1977, Sales and Marketing Management, New York.

Figure 2

GROSS NATIONAL PRODUCT AND RETAIL SALES OF EATING AND DRINKING PLACES IN THE UNITED STATES, 1958-1976

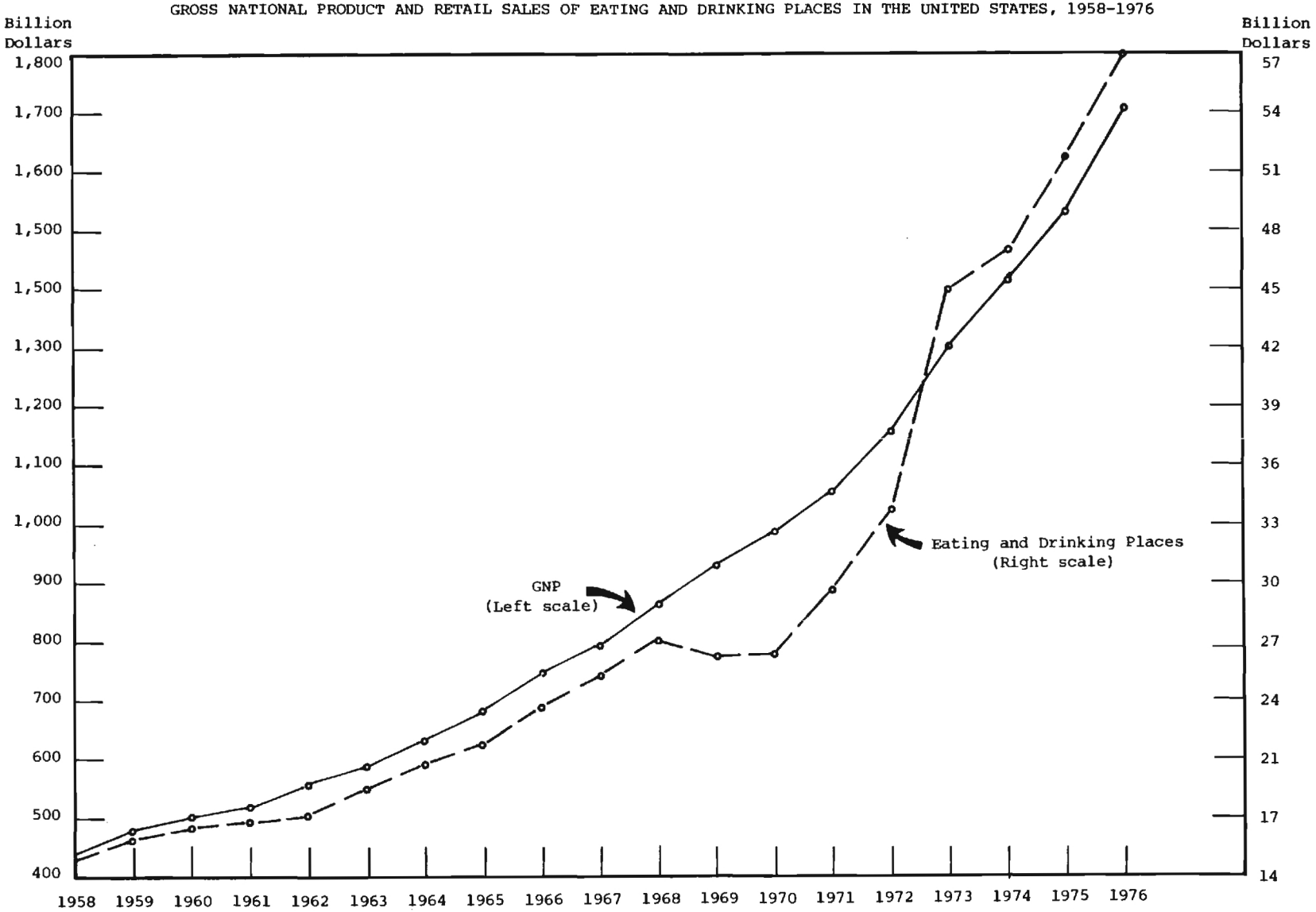


Table 2

RETAIL SALES OF EATING AND DRINKING PLACES AND THE VALUE OF PRODUCT SHIPMENTS OF COMMERCIAL COOKING AND FOOD WARMING EQUIPMENT IN THE UNITED STATES, 1958-1976 AND PROJECTION
(in millions of dollars)

Year	Retail Sales of Eating and Drinking Places[1/]	Value of Product Shipments of Commercial Cooking and Food Warming Equipment[2/]
1958	14,839	73.2
1959	16,031	79.5
1960	16,501	86.5
1961	16,849	95.5
1962	17,133	97.5
1963	18,558	107.0
1964	19,747	108.1
1965	21,753	157.6
1966	23,768	188.7
1967	25,209	158.2
1968	27,155	219.2
1969	26,271	263.1
1970	26,367	200.5
1971	29,620	204.2
1972	33,608	217.0
1973	45,199	247.9
1974	47,011	290.8
1975	51,759	310.1
1976	56,852	370.5*
1977	61,202	407.1*
1978	67,905	438.4*
1980	82,847	540.2*
1985	129,527	835.0*

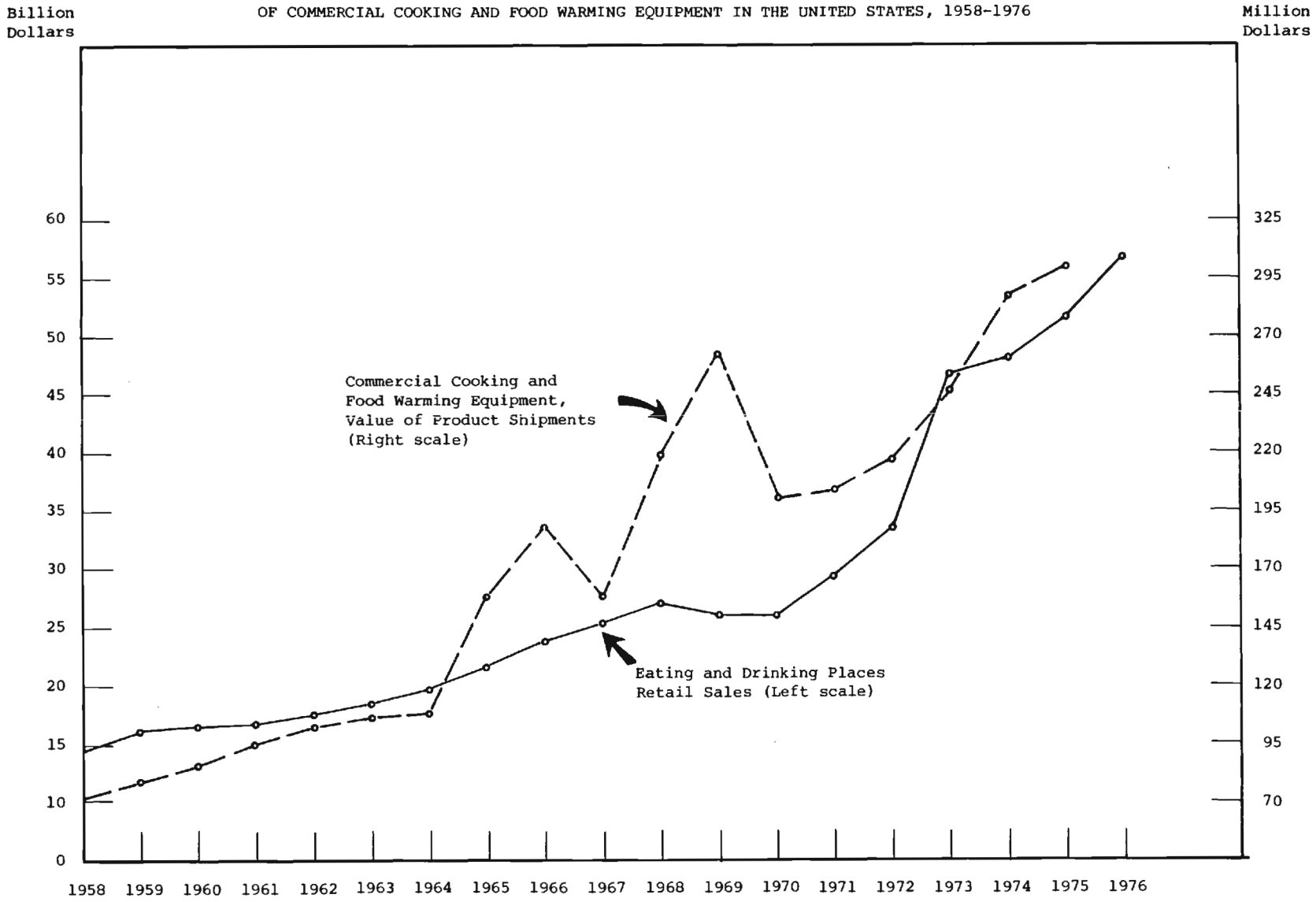
* Linear correlation between eating and drinking places' retail sales (X) and the value of product shipments on commercial cooking and food warming equipment (Y):
  Estimating equation: $Y = -1.7 + 0.00719X$
  or $Y = -1.7 + (0.719 \times 10^{-2}X)$
  Coefficient of correlation: $r = 0.849757$
  Standard error of estimate: $s = \$29.844$ million

Sources: 1/ Survey of Buying Power, 1959-1977, Sales and Marketing Management, New York.

2/ U. S. Department of Commerce, Census of Manufactures, 1958, 1963, 1967, 1972 and Annual Survey of Manufactures, 1975. (Under SIC 35891.)

Figure 3

RETAIL SALES OF EATING AND DRINKING PLACES AND THE VALUE OF PRODUCT SHIPMENTS OF COMMERCIAL COOKING AND FOOD WARMING EQUIPMENT IN THE UNITED STATES, 1958-1976



shipments of commercial cooking and food warming equipment had an annual growth rate of 8.9% between 1958 and 1975 and was projected to have a growth rate of 9.4% a year between 1976 and 1985.

Nearly all outputs from the food service equipment industry are purchased by commercial eating and drinking places or the food service industry. The food service industry itself has a special place in this study because of the distribution of the industry in terms of retail sales and was used as the base for determining the market distribution of food service equipment in the nation. A concise report on the food service industry and its outlook are given in the next section, followed by four sections on the food service equipment industry in terms of marketing sales, regional markets, marketing practices, and manufacturing plant distribution.

Food Service Industry

A growing percentage of meals are being eaten away from home. According to the U. S. Department of Agriculture, 30 cents of every consumer food dollar in 1975 went to a food service facility, up from 24 cents in 1963. Current social conditions seem to favor the continuation of the trend to eat away from home. Late marriages, higher divorce rates, working women, smaller families, higher personal incomes -- all contribute to a future of expansion for the food service industry. The growing trend of eating away from home has an important impact, not only on the food service industry, but also on the food service equipment industry as well.

According to Institutions, total food service sales increased from $42,674 million to $85,797 million between 1970 and 1977, a 83.3% increase. The sales were projected to $113,258 million by 1980, a 32% increase between 1977-1980. These sales are classified into two sectors -- food sales and alcoholic beverage. Under food sales, the three subsectors are commercial, noncommercial, and other. Details are given in Table 3.

Further details on food service markets under both commercial and noncommercial, 1970-1980, are given in Table 4. The commercial markets are restaurants, fast food, hotels/motels, retail, and recreation. The noncommercial markets are health care, colleges/universities, schools, employee feeding, transportation, and military. Their respective sales and growth rates are given in Table 4. The fast food market shows the fastest growth record, while the restaurant market has been dominant in total sale dollars.

Table 3

SALES OF THE FOOD SERVICE INDUSTRY IN THE UNITED STATES, 1970-1980
(in millions of dollars)

	1970	1976	1977*	1980*	Growth Rate % 1970-76	Growth Rate % 1977-80*
Food Sales						
Commercial	$24,730	$51,170	$56,619	$ 77,490	+106.9	+36.9
Noncommercial	16,331	24,627	26,571	32,553	+ 50.8	+22.5
Other	1,613	2,436	2,607	3,215	+ 51.0	+23.3
Total Food Sales	$42,674	$78,233	$85,797	$113,258	+ 83.3	+32.0
Alcoholic Beverage Sales	4,291	7,461	8,220	11,266	+163.2	
TOTAL SALES	$46,955	$85,694	$94,017	$124,524	+165.2	

* Estimated.

Source: "Second Annual Report," Institutions/Volume Feeding Magazine, March 15, 1977, Cahners Publishing Co., Denver, p. 143.

Table 4

FOOD SERVICE MARKETS IN THE UNITED STATES, 1970-1980
(in millions of dollars)

	1970	1976	1977*	1980*	Growth Rate % 1970-76	Growth Rate % 1977-80*
Restaurants	$13,760	$28,490	$31,339	$ 40,650	+107.1	+29.7
Fast Food	6,540	15,240	17,069	25,740	+133.0	+50.8
Hotels/Motels	1,780	2,990	3,259	4,380	+ 68.0	+34.4
Retail	1,480	2,560	2,816	3,750	+ 73.0	+33.2
Recreation	1,170	1,890	2,136	2,970	+ 61.5	+39.0
Total Comm'l.	$24,730	$51,170	$56,619	$ 77,490	+106.9	+36.9
Health Care	4,110	6,742	7,281	9,378	+ 64.0	+28.8
Colleges/Univs.	2,006	3,063	3,337	3,843	+ 52.7	+15.2
Schools	4,492	6,600	7,062	8,332	+ 46.9	+18.0
Employee Feeding	2,223	4,455	4,856	5,875	+100.4	+21.0
Transportation	601	931	1,071	1,267	+ 54.9	+18.3
Military	2,899	2,836	2,964	3,858	- 2.2	+31.0
Total Noncom.	$16,331	$24,627	$26,571	$ 32,553	+ 50.8	+22.5
Other	1,613	2,436	2,607	3,215	+ 51.0	+23.3
TOTAL	$42,674	$78,233	$85,797	$113,258	+ 83.3	+32.0

* Estimated.

Source: "Second Annual Report," Institutions/Volume Feeding Magazine, March 15, 1977, Cahners Publishing Co., Denver, p. 143.

In 1976, sales of food by the food service industry, excluding alcoholic beverages, totaled $78,233 million. When alcoholic beverage sales were included, food sales rose to $85,694 million and were substantially higher than the $56,852 million sales in eating and drinking places as reported in Table 2. According to an estimate made by the U. S. Department of Agriculture, the retail value of the 1976 market for food and nonalcoholic beverages consumed away from home was $64 billion to $71 billion.[1/] The value of the USDA's estimate lies between the two estimates reported in Table 2 and Table 3. The higher estimate in Table 3 may be attributed to its larger coverage of market outlets than the other two estimates.

The number of food service units in operation from 1970 to 1977, with projections to 1980, are presented in Table 5. Total units increased from 495,495 in 1970 to 554,228 in 1977 and projected to number 575,789 by 1980, a growth rate of 16.2% in two decades. Fast food units increased from 66,520 in 1970 to

Table 5

NUMBER OF FOOD SERVICE UNITS IN THE UNITED STATES, 1970-1980

	1970	1976	1977*	1980*	Growth Rate % 1970-80*
Restaurants	165,000	173,150	173,000	169,690	+ 2.8
Fast Food	66,530	104,990	112,860	140,210	+110.7
Hotels/Motels	41,400	43,200	43,200	43,000	+ 3.9
Retail	45,000	55,000	56,000	59,000	+ 31.1
Recreation	30,900	24,400	25,095	23,500	- 23.9
Total Commercial	348,830	401,740	410,155	435,400	+ 24.8
Health Care	27,580	28,660	28,800	29,082	+ 5.4
Colleges/Universities	2,525	2,830	2,886	3,060	+ 21.2
Schools	116,300	112,700	112,136	108,000	- 6.9
Military	260	255	251	247	- 5.0
Total Noncomm'l.	146,665	114,445	144,073	140,389	- 4.2
TOTAL	495,495	546,185	554,228	575,789	+ 16.2

* Estimated

Source: "Second Annual Report," Institutions/Volume Feeding Magazine, March 15, 1977, Calners Publishing Co., Denver, p. 145.

1/ Michael G. Van Dress, "The Market for Food Away from Home: Market Profile and Factors Affecting Demand for Dairy Products," a paper presented at the Annual Staff Conference of Associated Milk Producers, Inc., Brownsville, Texas, October 25-27, 1976, U. S. Department of Agriculture, Economic Research Service.

112,860 units in 1977 and are projected to rise to 140,210 units by 1980, a 110.7% increase in the same period. Fast food units are the fastest growth market. The details are given in Table 5.

It is apparent from the data presented in this section that the food service industry will continue to grow both in sales and in serving units. This growth phenomenon is important to the food service equipment industry since its market outlets are entirely geared to the food service industry.

Marketing Sales

The marketing sales of food service equipment were supplied by Institutions for 1975, 1976, and 1977. The sales are classified under nine categories: storage and handling, food preparation, cooking equipment, warewashing/sanitation, serving, local fabrication, kitchenware/cooking, maintenance and cleaning supplies, and permanent tableware. Major food equipment items under each category follow:

(1) Storage and handling - Refrigerators, freezers, shelving, hand trucks and carts, etc.

(2) Food preparation - Mixers, cutlers, slicers, choppers, beaters, dicers, tendering machines, ice makers, can openers, work tables, etc.

(3) Cooking equipment - Ranges, grills, ovens, fryers, rotisseries, griddles, broilers, kettles, cookers, coffee makers, toasters, hot plates, counter model food warmers, etc.

(4) Warewashing/sanitation - Dishwashing machines, racks, sinks, bus boxes and carts, disposers, washers, scraping equipment, silver burnishers, fat filter equipment, hot water boosters, filters, etc.

(5) Serving - Cafeteria lines, dispensers, serving carts, soda fountains, etc.

(6) Local fabrication - Custom-made shelvings and other items to set in standard factory items.

(7) Kitchenware/cooking - Pots, pans, trays, etc.

(8) Maintenance and cleaning supplies - Soaps, detergents, floor waxes, cleaning compounds, tablecloths, napkins, etc.

(9) Permanent tableware - Glass, china, flatwares, etc.

The marketing sales of these nine categories in the United States from 1975 to 1977 and the projected value of 1980 and 1985 sales are presented in

Table 6. The first five categories are major items in food service equipment, while the latter four categories are auxiliary items. The industrywide sales increased from $1,714 million in 1975 to $2,109 million in 1977, an annual growth rate of 10.9%. The total sales were projected to $3,084 million by 1980 and $4,768 million by 1985. The projected 10.8% annual growth rate is comparable to the growth rate between 1975 to 1977. Some variations of annual growth rates are found among the nine categories; however, 10% to 11% increase a year is typical. Details of these sales are given in Table 6.

Table 6

MARKETING SALES OF FOOD SERVICE EQUIPMENT IN THE UNITED STATES, 1975-1977 AND PROJECTED 1980 AND 1985
(in millions of dollars)

Category	1975	1976	1977	1980	1985	Annual Growth % 1975-77	Annual Growth % 1977-85
Storage and Handling	$ 223	$ 255	$ 300	$ 415	$ 643	16.0	10.0
Food Preparation	132	145	159	234	361	9.7	10.8
Cooking Equipment	295	350	364	540	835	11.0	10.9
Warewashing/ Sanitation	213	240	264	384	594	11.3	10.7
Serving	201	225	238	356	550	8.8	9.7
Subtotal	$1,064	$1,215	$1,325	$1,929	$2,983	11.6	10.7
Local Fabrication	$ 171	$ 190	$ 210	$ 306	$ 473	10.8	10.7
Kitchenware/Cooking	92	105	112	165	256	10.4	10.9
Supplies (Maintenance and Cleaning)	59	65	73	106	163	11.3	10.6
Tableware (Permanent)	328	360	389	578	893	8.9	10.9
Subtotal	$ 650	$ 720	$ 784	$1,155	$1,785	9.8	10.8
Total	$1,714	$1,935	$2,109	$3,084	$4,768	10.9	10.8

Sources: 1975-1977 - Supplied by Institutions, Volume Feeding Magazine, Marketing Research Department, Chicago.

1980-1985 - Projected by the Georgia Tech Economic Development Division.

The marketing sales of cooking equipment in Table 6 deserve special attention for they are the same as those given for commercial cooking and food warming equipment (SIC 35891) in Table 2. Likewise, the projected sales of this category for 1980 and 1985 are the same in Tables 2 and 6.

It is important to note that the marketing sales presented in Table 6 are sale returns to food service equipment distributors, but not manufacturers. The difference between a manufacturer's f.o.b. shipment value and a distributor's market price can be substantial, depending upon the commodity. These differences are explained in the section dealing with marketing practices.

Regional Markets

The marketing sales and f.o.b. plant shipments of food service equipment in nine regional markets are given in Table 7. The sales by region were estimated on the basis of the retail sales of eating and drinking places in each region. The relationship between the marketing sales of food service equipment and the retail sales of eating and drinking places has been established in a previous section. In this table, the retail sales of eating and drinking places in each region and its U. S. share are presented first, followed by the values of marketing sales and f.o.b. plant shipments of food service equipment in each region for 1976. Marketing sales refer to sales made by distributors or agents while f.o.b. plant shipments consist of the sales made by manufacturers to distributors or agents. The marketing sales of food service equipment are consistent with the share of an individual region's retail sales of eating and drinking places. The value of f.o.b. shipments of food service equipment by manufacturers was estimated at about 60% of the industry's sales (or distributors' sales).

The sales distribution of food service equipment is apparently following the distribution of population and personal income reflected by the retail sales of eating and drinking places in different regions. Heavily populated regions such as East North Central, Mid-Atlantic, South Atlantic, and Pacific lead in marketing sales. Detailed estimates on the marketing sales and the f.o.b. plant shipments are presented in Table 7. The component states of each region are also given at the end of the table.

The seven-state region, consisting of Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee, is of special interest to this study because of its close proximity to Southwest Georgia. Marketing sales and f.o.b. plant shipments of food service equipment in this region were estimated on the basis of the retail sales of eating and drinking places in each state and are presented in Table 8. In 1976, the total marketing sales in the region were estimated at over $250 million and f.o.b. plant shipments were

Table 7

ESTIMATED MARKETING SALES AND F.O.B. PLANT SHIPMENTS OF FOOD SERVICE EQUIPMENT BY REGION IN THE UNITED STATES, BASED ON RETAIL SALES OF EATING AND DRINKING PLACES, 1976
(in thousands of dollars)

Region	Eating and Drinking Places[1/]		Food Service Equipment	
	Retail Sales	As a % of U. S.	Marketing Sales[2/]	F.o.b. Plant Shipments[3/]
New England	$ 3,278,900	5.7674	$ 111,600	$ 66,959
Mid-Atlantic	8,795,713	15.4713	299,370	179,621
East North Central	11,979,663	21.0717	407,737	244,642
West North Central	4,322,845	7.6037	147,132	88,278
South Atlantic	8,448,204	14.9480	289,244	173,545
East South Central	2,429,475	4.2733	82,868	49,720
West South Central	4,991,317	8.7795	169,883	101,930
Mountain	2,719,449	4.7834	92,560	55,535
Pacific	9,836,313	17.3016	334,786	200,870
Total U. S.	$56,851,313	100.0000	$1,935,000	$1,161,000

New England - Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

Middle Atlantic - New Jersey, New York, Pennsylvania

East North Central - Illinois, Indiana, Michigan, Ohio, Wisconsin

West North Central - Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota

South Atlantic - Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia

East South Central - Alabama, Kentucky, Mississippi, Tennessee

West South Central - Arkansas, Louisiana, Oklahoma, Texas

Mountain - Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming

Pacific - Alaska, California, Hawaii, Oregon, Washington

Sources: 1/ Survey of Buying Power, 1977, Sales and Marketing Management, New York.

2/ Estimated marketing sales of food service equipment distributors.

3/ Estimated f.o.b. plant shipments of food service equipment manufacturers.

Table 8

ESTIMATED MARKETING SALES AND F.O.B. PLANT SHIPMENTS OF FOOD SERVICE EQUIPMENT IN SEVEN SOUTHEASTERN STATES, BASED ON RETAIL SALES OF EATING AND DRINKING PLACES, 1976
(in thousands of dollars)

State	Eating and Drinking Places[1/]		Food Service Equipment	
	Retail Sales	As a % of U. S.	Marketing Sales[2/]	F.o.b. Plant Shipments[3/]
Alabama	$ 640,411	1.1265	$ 21,797	$ 13,078
Florida	2,820,808	4.9617	96,009	57,605
Georgia	1,203,152	2.1163	40,950	24,570
Mississippi	336,069	0.5911	11,438	6,863
North Carolina	999,908	1.7588	34,033	20,420
South Carolina	497,005	0.8742	16,916	10,150
Tennessee	863,050	1.5181	29,375	17,625
Seven-State Total	$ 7,360,403	12.9466	$ 250,518	$ 150,311
U. S. Total	$56,851,879	100.0000	$1,935,000	$1,161,000

Sources: 1/ Survey of Buying Power, 1977, Sales and Marketing Management, New York.

2/ Estimated marketing sales of food service equipment distributors.

3/ Estimated f.o.b. plant shipments of food service equipment manufacturers.

estimated at over $150 million. A ranking of food service equipment sales in the seven-state region shows that Florida led the region with 38%, Georgia 16%, North Carolina 14%, Tennessee 12%, Alabama 9%, South Carolina 7%, and Mississippi 4%. Out of total national sales in 1976, Florida's share constituted nearly 5%, Georgia 2%, North Carolina 1.8%, Tennessee 1.5%, Alabama 1.1%, South Carolina 0.9%, and Mississippi 0.6%. Details are given in Table 8.

The trends in the retail sales of eating and drinking places in each of the seven states have clearly shown a marked upward movement. Retail sales of eating and drinking places as a percentage of the U. S. total sales in each state from 1964 to 1976 are given in Table 9. (Actual data are given in Appendix 1.) These trends were projected to 1980 and 1985 and their projecting equations are given at the end of Table 9. Although Florida's position would still be dominant in the region by 1985, Georgia and South Carolina would have a faster rate of growth between 1976 and 1985, according to the projections.

Table 9

RETAIL SALES OF EATING AND DRINKING PLACES AS A PERCENT OF UNITED STATES TOTAL IN SEVEN SOUTHEASTERN STATES, 1964-1976

Year	Ala.	Fla.	Ga.	Miss.	N. C.	S. C.	Tenn.	Seven-State Total
1964	0.80	3.26	1.23	0.39	1.24	0.52	1.07	8.51
1965	0.80	3.34	1.25	0.40	1.27	0.52	1.10	8.68
1966	0.80	3.39	1.28	0.40	1.25	0.52	1.12	8.76
1967	0.78	3.48	1.28	0.40	1.26	0.52	1.12	8.84
1968	0.77	3.48	1.28	0.40	1.25	0.52	1.11	8.81
1969	0.81	3.72	1.55	0.42	1.45	0.63	1.16	9.73
1970	0.82	3.83	1.56	0.43	1.45	0.64	1.17	9.90
1971	0.86	3.69	1.47	0.45	1.38	0.59	1.17	9.62
1972	0.99	3.90	1.46	0.50	1.36	0.62	1.17	10.01
1973	0.95	4.75	1.88	0.49	1.65	0.83	1.42	11.96
1974	1.09	4.86	2.10	0.59	1.69	0.85	1.61	12.80
1975	1.11	4.79	2.11	0.58	1.74	0.85	1.56	12.75
1976	1.13	4.96	2.12	0.59	1.76	0.87	1.52	12.95
1980	1.21	5.49	2.41	0.65	1.91	0.99	1.69	14.35
1985	1.36	6.26	2.82	0.74	2.15	1.16	1.91	16.40

Sources: 1964-76 computed from Survey of Buying Power, 1965-1977, Sales and Marketing Management, New York.

1980 and 1985 were projected by the Georgia Tech Economic Development Division.

State	Projecting Equation	Coefficient of Correlation (R)
Alabama	Y = 0.681923 + 0.0317637 (X)	0.897
Florida	Y = 2.88269 + 0.153571 (X)	0.933
Georgia	Y = 1.00538 + 0.0824176 (X)	0.920
Mississippi	Y = 0.335385 + 0.0184615 (X)	0.926
North Carolina	Y = 1.11346 + 0.046978 (X)	0.912
South Carolina	Y = 0.415385 + 0.0338462 (X)	0.913
Tennessee	Y = 0.946538 + 0.0439011 (X)	0.870

Based on the projected ratios of each state to the U. S. total retail sales of eating and drinking places, the marketing sales and f.o.b. plant shipments of food service equipment in 1980 and in 1985 for the seven southeastern states were estimated. In the seven southeastern states, the marketing sales were projected to increase from $250 million in 1976 to $442 million by 1980 and to $782 million by 1985. F.o.b. plant shipments would increase from $150 million in 1976 to $265 million by 1980 and to $470 million by 1985. The details on these marketing sales are given in Table 10.

All marketing sales of food service equipment, according to a trade specialist, have followed roughly a 50-50 split between the market for new establishments and the market for replacements associated with established eating and drinking places. The increasing shares of the market sales in the seven southeastern states reflect the region's booming economic growth in the coming decades as compared to other regions in the nation. It means also that the market for new establishments will be especially favorable in the region.

Marketing Practices

In the early years, kitchen equipment was built on order or on a custom-made basis. The manufacturers not only built the equipment, but also sold it as well. Gradually standards were developed to meet service requirements for size, weight, and construction. Standardization made possible volume production and later mass production to reduce unit costs and to speed delivering time. Today the manufacturers of food service equipment sell their outputs to distributors (or dealers), who, in turn, sell them to eating and drinking places.

The function of a dealer is to plan for the needs of his customers. He specifies what is needed, selects from different manufacturers, supervises the installation, and thus provides a complete planning, equipment, and supply service. The approximately 3,000 dealers presently in business can be classified as follows:[1/]

Supply House - Deals in china, silverware, kitchen utensils, and supplies.

Equipment Dealers - Specializes in selling kitchen machinery and equipment from a single item to a complete installation.

1/ I. S. Anoff, Food Service Equipment Industry, Cahners Books, Boston, 1972.

Table 10

ESTIMATED MARKETING SALES AND F.O.B. PLANT SHIPMENTS
OF FOOD SERVICE EQUIPMENT IN SEVEN SOUTHEASTERN STATES,
BASED ON PROJECTED RETAIL SALES OF EATING AND DRINKING PLACES, 1980 AND 1985
(in millions of dollars)

State	1980			1985		
	Eating and Drinking Places	Food Service Equipment		Eating and Drinking Places	Food Service Equipment	
	Retail Sales as a % of U. S.	Marketing Sales	F.o.b. Plant Shipments	Retail Sales as a % of U. S.	Marketing Sales	F.o.b. Plant Shipments
Alabama	1.21	$ 37.32	$ 22.39	1.36	$ 64.84	$ 38.90
Florida	5.49	169.31	101.59	6.26	298.48	179.09
Georgia	2.41	74.32	44.59	2.82	134.46	80.68
Mississippi	0.65	20.05	12.03	0.74	35.28	21.68
North Carolina	1.91	58.90	35.34	2.15	102.51	61.51
South Carolina	0.99	30.53	18.31	1.16	55.31	33.19
Tennessee	1.69	52.12	31.27	1.91	91.07	54.64
Seven-State Total	14.35	$ 442.55	$ 265.52	16.40	$ 781.95	$ 469.69
U. S. Total	100.00	$3,084.00	$1,850.40	100.00	$4,768.00	$2,860.80

Source: Projected and Estimated by the Georgia Tech Economic Development Division.

Full-Line Dealers - Combines equipment and supplies.

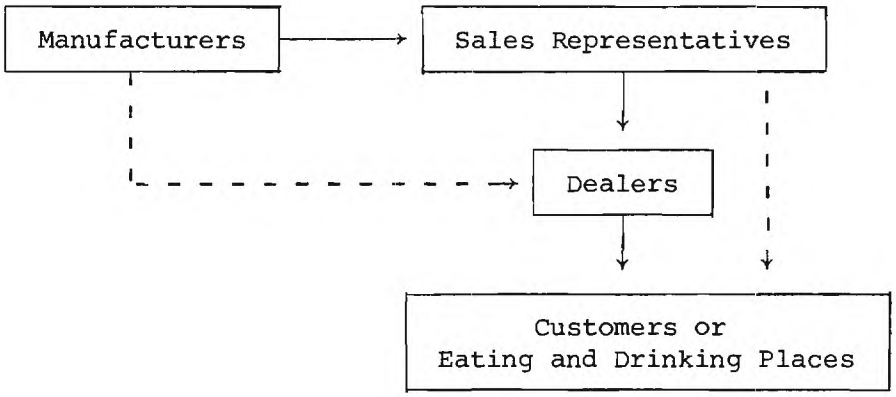
Table-Top Service - Specializes in china, glass, flatware, tableware, and other items essential to service and decor.

Fabricators - Dealers having complete sheet metal manufacturing facilities for handling installation and fabricating custom items.

Many manufacturers strategically place their own sales representatives at major locations throughout the nation to contact dealers. Sales representatives also contact end users to promote sales, but actual sales are generally made through dealers. Some dealers specialize in dealing with new establishments rather than the replacement market, and some cater to a specific outlet, such as the institutional market (schools and hospitals).

Figure 4

A MARKETING FLOW CHART OF FOOD SERVICE EQUIPMENT



Listed prices are maintained by manufacturers on their equipment and machinery. Based on listed prices, trade discounts are given to dealers. The extent of trade discounts depend upon commodities. Generally, the greater the service required to install a commodity, the larger the discount would be. Most commonly used discounts are 50-10, 50-5, and 50-10-5. For example, a 50-10 discount means that a dealer pays $45 to a manufacturer for an item with a listed price of $100, after a 50% and a 10% discount. For commodities requiring little installation service, trade discounts may vary from 20% to 35%. In the previous section, an average of 40% discount was used on the industry's marketing sales to arrive at f.o.b. plant shipments' value.

Manufacturers generally sell their equipment based on f.o.b. plant. However, most manufacturers are willing to pay freight equalization costs to a dealer in order to compete with another manufacturer nearer to the customer. When a dealer prepares a bid, he has to consider installation specifications and costs, manufacturer's discounted price, and, to some degree, freight cost between manufacturing plant and end user's location in order to arrive at a desirable profit margin.

Distribution of Manufacturing Plants

There may be as many as 500 manufacturers of food service equipment. They range from small firms making only one or more specialties to big companies with comprehensive lines of products. According to a trade source, the food service market is characterized by a vast number of relatively small manufacturers selling on a national basis. For most equipment items, the level of technology is quite low, with manufacturers often buying major components on an original equipment manufacturer (OEM) basis, and later assembling and marketing under their own brand name. Therefore, locations in Southwest Georgia probably would rule out few, if any, of the potential categories of manufacturers.

The 1977 Membership Roster of the National Association of Food Equipment Manufacturers, lists 345 food service equipment manufacturers. Although this is not a comlete listing, it comprises the bulk of the industry's manufacturers today. The distributions is shown by state in Table 11 and in Map 2.

Obviously, the distribution is highly concentrated in the northern industrial belt of New York, New Jersey, Pennsylvania, Ohio, Illinois, and Wisconsin. In the West, California is also saturated with this type of manufacturing. In the seven-state southeastern region, only 29 food service equipment plants are located, or about 8% of the 345 plants. In view of the increasing retail sales of eating and drinking places in the southeastern states, it is a proper time to take a close look at what some localities in Southwest Georgia can offer the food service equipment manufacturer.

Table 11

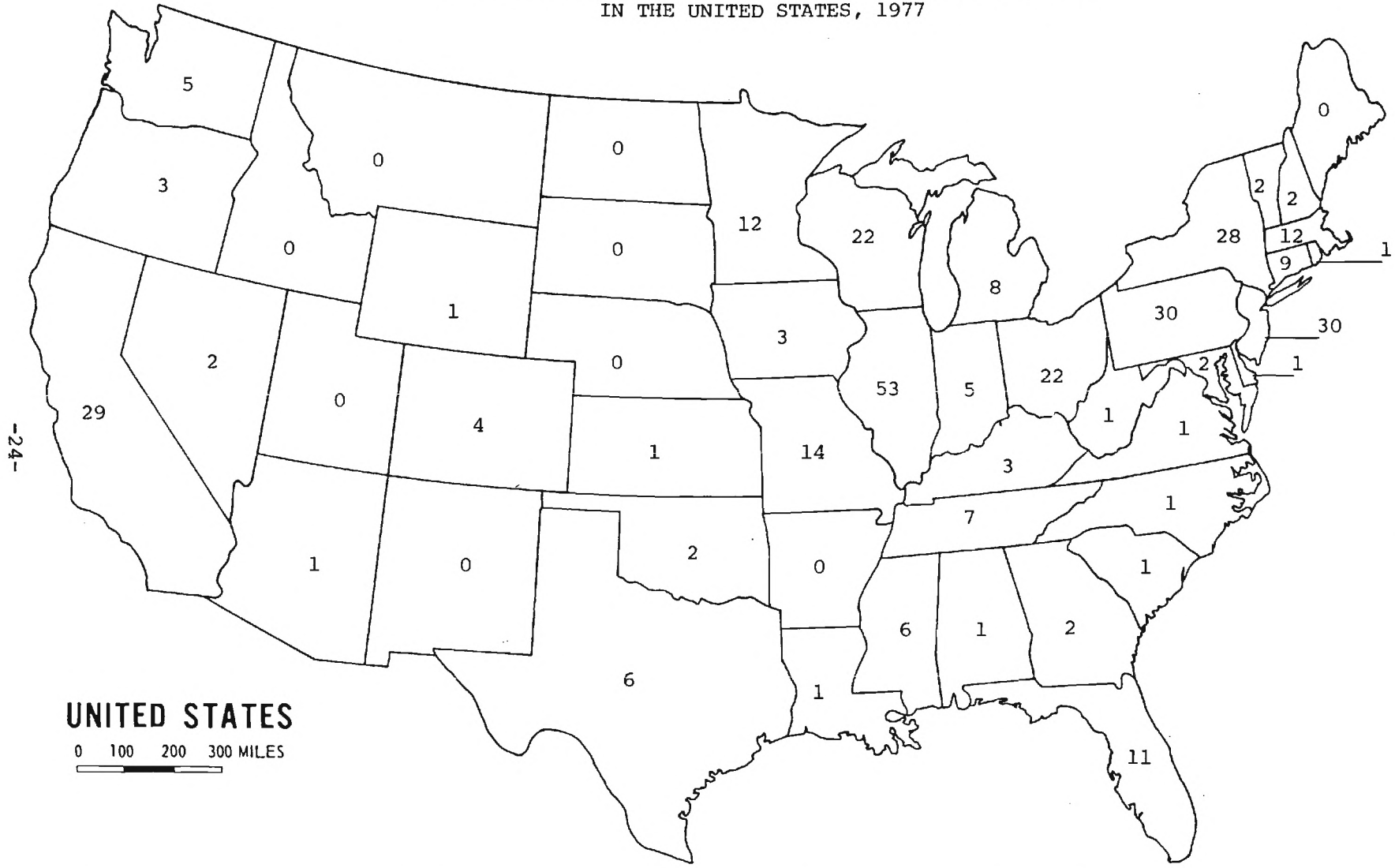
DISTRIBUTION OF FOOD SERVICE EQUIPMENT MANUFACTURING PLANTS IN THE UNITED STATES, 1977

State	No.	State	No.
Alabama	1	Nevada	2
Arizona	1	New Hampshire	2
California	29	New Jersey	30
Colorado	4	New York	28
Connecticut	9	North Carolina	1
Delaware	1	Ohio	22
Florida	11	Oklahoma	2
Georgia	2	Oregon	3
Illinois	53	Pennsylvania	30
Indiana	5	Rhode Island	1
Iowa	3	South Carolina	1
Kansas	1	Tennessee	7
Kentucky	3	Texas	6
Louisiana	1	Vermont	2
Maryland	2	Virginia	1
Massachusetts	12	Washington	5
Minnesota	12	West Virginia	1
Michigan	8	Wisconsin	22
Mississippi	6	Wyoming	1
Missouri	14	Total	345

Source: 1977 Membership Roster, National Association of Food Equipment Manufacturers, Chicago.

Map 2

NUMBER OF FOOD SERVICE EQUIPMENT MANUFACTURING PLANTS
IN THE UNITED STATES, 1977



Source: 1977 Membership Roster, National Association of Food Equipment Manufacturers, Chicago.

THE FEASIBILITY OF A SOUTHWEST GEORGIA LOCATION FOR FOOD SERVICE EQUIPMENT MANUFACTURE

In order to evaluate objectively the overall desirability of Southwest Georgia as a location for food service equipment manufacture, it is important to assess the major characteristics of the area in which the manufacture may take place. This is an important perspective because the distribution of manufacturing in the United States has been undergoing significant change since the end of World War II. Growth has occurred in areas characterized by desirable attributes such as available and dependable labor, improved access to materials and markets, gentle climatic and working conditions, and other benefits. In this context, the following nine sections deal with economic growth, labor, wages and labor productivity, materials and supplies, transportation, power and fuels, accessibility to markets, plant sites, and education and training facilities.

Relative Growth of the Southeast

The growth record of a region should provide a prospective plant location planner with a brief overview of the overall economic conditions of the area under consideration before he begins serious investigations on such specific matters as labor, wage, material supply, etc. For this reason, the following 13 major elements were chosen to reflect the economic activities of the Southeast: population, nonagricultural employment, manufacturing employment, construction employment, total personal income, per capita personal income, total long-term savings of individuals, wholesale sales, retail sales, value added by manufacture, new plant investment, installed capacity of electric utilities, and new automobile registration. The detailed data relating to these elements in seven southeastern states from 1950 to the latest available year are given in Appendices 2 to 14.

The economic growth of these elements in the seven southeastern states compared with the United States is given in Table 12. From 1950 to 1972, 1975 or 1976, depending upon the availability of data, the percentage growth for the region in each selected element is compared with the United States. The growth in the region exceeded that of the nation in all categories by large margins. In looking at major elements such as nonagricultural employment, manufacturing employment, construction employment, total personal income, long-term

Table 12

RELATIVE GROWTH OF SEVEN SOUTHEASTERN STATES
COMPARED WITH THE UNITED STATES, 1950-1976

Item	Period	Seven Southeastern States[1/]	U. S.
		(percent increase)	
Population	1950-76	53	42
Nonagricultural Employment	1950-72	118	61
Manufacturing Employment	1950-72	86	25
Construction Employment	1950-72	131	36
Total Personal Income	1950-76	840	482
Per Capita Personal Income	1950-76	441	328
Total Long-Term Savings of Individuals	1950-75	1,351	785
Wholesale Sales	1954-72	294	190
Retail Sales	1950-76	553	370
Value Added by Manufacture	1950-76	718	388
New Plant Investment	1950-75	410	380
Installed Capacity of Electric Utilities	1950-75	1,045	661
New Auto Registration	1959-75	67	37

1/ Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee.

Source: See Appendices 2-14.

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individual savings, value added by manufacture, and installed capacity of electric utilities, the regional increases were twice or several times that of the U. S. increases during the past two to three decades.

Because of the faster rate of economic growth in the southeastern region compared with the nation as a whole, the regional share of the U. S. total in all 13 categories has registered significant increases and the trends are persistent. Detailed ratios on the economic elements of the seven southeastern states as a percent of the U. S. totals from 1950 to 1976 are presented in Table 13.

Table 13

ECONOMIC GROWTH OF SEVEN SOUTHEASTERN STATES[1/]
AS A PERCENT OF UNITED STATES TOTAL, 1950-1976

Item	1950	1960	1970	1972	1975	1976
Population	13.8	13.9	14.1	-	-	14.9
Nonagricultural Employment	10.2	11.5	12.8	13.7	-	-
Manufacturing Employment	10.2	11.8	14.6	15.3	-	-
Construction Employment	11.6	13.5	18.4	19.8	-	-
Total Personal Income	9.2	9.9	11.4	-	-	14.8
Per Capita Personal Income	65.6	69.4	78.9	-	-	83.0
Total Long-Term Savings of Individuals	6.8	8.5	9.9	-	11.1	-
Wholesale Sales[2/]	9.1	9.5	10.8	12.4	-	-
Retail Sales	10.0	11.4	12.8	-	-	13.9
Value Added by Manufacture	7.7	9.2	11.9	-	-	12.9
New Plant Investment	9.5	11.6	14.1	-	15.4	-
Installed Capacity of Electric Utilities	12.1	15.0	16.0	-	18.2	-
New Auto Registration[3/]	11.5	12.9	13.4	-	14.1	-

1/ Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee.

2/ Reflecting the years of 1954, 1958, 1967, and 1972, respectively.

3/ Reflecting the years of 1959, 1966, 1969, and 1975, respectively.

Sources: See Appendices 2-14.

Availability of Labor Requirements

Because of the diversity of the product lines in food service equipment, labor requirements are also varied. However, the labor requirements of the food service equipment manufacture are generally consistent with other types of metalworking industries. A profile of skilled and nonskilled workers together with professional personnel needed in the industry is presented in Table 14. The profile was constructed from the results of a mail survey conducted (see details in Appendix 15) and information obtained from other sources. The major types of skills needed are plant managers, engineers, foremen, assemblers, welders, machinists, sheet metal workers, painters, setup men, and other non-skilled supporting workers.

Table 14

AVAILABILITY BY LOCATION IN SOUTHWEST GEORGIA OF OCCUPATIONS REQUIRED BY THE FOOD SERVICE EQUIPMENT INDUSTRY, 1977

Required Occupation	Albany	Bainbridge	Thomasville	Moultrie
1. Managers and administrators	P	P	P	P
2. Engineers	P	P	P	P
3. Engineering technicians	P	P	P	P
4. Salesmen and clerks	P	P	P	P
5. Secretaries, bookkeepers, and accountants	P	P	P	P
6. Foremen	P	P	P	P
7. Machine Operators	P	P	P	P
8. Precision machine operators	P	P	P	P
9. Machinists	P	P	P	P
10. Mechanics and repairmen	P	P	P	P
11. Tool and die makers	A	A	P	P
12. Setup men	P	P	P	P
13. Welders and flame cutters	P	P	P	P
14. Punch and stamping pressers	P	P	P	P
15. Metal platers	P	P	P	P
16. Miscellaneous operators	P	P	P	P
17. Filers, sanders, polishers, or buffers	P	P	P	P
18. Assemblers	P	P	P	P
19. Checkers and inspectors	P	P	P	P
20. Packers and wrappers	p	p	p	p
21. Shipping and receiving clerks	p	p	p	p
22. Winding operators	p	p	p	p
23. Forklift operators	p	p	p	p
24. Cleaning-service workers	p	p	p	p

P = Workers are present.

A = Workers are absent.

Source: Southwest Georgia Area Planning and Development Commission, Camilla, Georgia.

In order to investigate the availability of these labor requirements in Southwest Georgia, four locations were examined -- Albany, Bainbridge, Thomasville, and Moultrie -- all representing larger cities in the area. Of the twenty-four occupational categories necessary for the food service equipment manufacture, all but one were available in the four locations. (See Table 14.) Tool and die makers were not found in Albany and Bainbridge, but were available in Thomasville and Moultrie. In Table 14, "P" shows what workers are present in a particular location, while "A" indicates their absence from that location. The details are given in the table.

Recruitable labor in the four locations is presented in Table 15. The recruitable labor force was estimated by taking the number of unemployed persons in the county of each of the four cities and adding 10% of the civilian employment in that county as of November 1977. Certainly, the unemployment rate of a given county varies from time to time. However, such a figure does provide some indication of recruitable labor. The recruitable labor force can be increased several times if the area of recruiting is expanded to include neighboring counties. For a medium-sized food service equipment plant with employment under 150, the potential labor in each county is sufficient for that purpose. Detailed data on civilian employment and potential labor force in the four-county area is given in Table 15.

Table 15

RECRUITABLE LABOR AT FOUR SOUTHWEST GEORGIA LOCATIONS, NOVEMBER 1977

Location	Civilian Employment	Unemployed	Potential Labor Force
Albany (Dougherty)	34,217	3,148	6,670
Bainbridge (Decatur)	10,725	510	1,580
Thomasville (Thomas)	14,836	670	2,110
Moultrie (Colquitt)	13,230	790	2,150

Source: Georgia Department of Labor, Atlanta.

Wage Rates, Labor Productivity, and Dependability

The Georgia labor force offers a beneficial combination to manufacturing industries -- low wage rates and high labor productivity and dependability.

Labor statistics compiled by both public and private agencies have clearly illustrated this fact. Average hourly earnings, labor productivity, and working time lost in 15 selected states are presented in Table 16. In 1976, average hourly earnings in Georgia were $4.74, 20% to 40% lower than the northern industrial states and the neighboring states of Alabama and Tennessee. Compared with Florida and the Carolinas, Georgia's rate was still lower.

Table 16

AVERAGE HOURLY EARNINGS, LABOR PRODUCTIVITY, AND WORKING TIME LOST IN SELECTED STATES, 1972-1976

State	Average Hourly Earnings (1976)	Labor Productivity (1975)[1/]	Average Percent of Working Time Lost (1972-1976)
Alabama	$5.78	$3.65	0.22
California	6.11	3.33	0.16
Florida	5.29	3.72	0.08
GEORGIA	4.74	4.71	0.06
Illinois	6.06	4.27	0.21
Indiana	6.28	4.00	0.25
Massachusetts	5.61	2.98	0.13
Michigan	6.55	3.46	0.25
New Jersey	6.19	3.60	0.16
New York	5.62	3.79	0.14
North Carolina	4.85	4.07	0.05
Ohio	5.85	3.96	0.31
Pennsylvania	5.73	3.86	0.27
South Carolina	5.31	2.65	0.03
Tennessee	5.80	2.74	0.20

1/ Labor productivity, as used here, is an economic term that gives the value added per dollar of total payroll cost.

Source: "Plant Sites, 1978," Chemical Week, December 14, 1977, p. 51.

Georgia's labor productivity, as measured by the value added per dollar of total payroll cost, has been among the highest in the nation. In 1975, Georgia's labor productivity of $4.71 compared favorably with Indiana's $4.00,

Pennsylvania's $3.86, Florida's $3.72, and South Carolina's $2.65. The detailed productivity rates by state are given in Table 16.

Between 1972 and 1976, the working time lost was only 6% in Georgia, compared to Alabama's 22%, Indiana's 25%, Pennsylvania's 27%, and Tennessee's 20%. (See Table 16.)

The dependability found in the Georgia labor force may be attributed to the right-to-work law passed by the Georgia Legislature in 1947. The Georgia right-to-work law follows:

> Sec. 54-804 Compelling persons to join, or refrain from joining, labor organization, or to strike or refrain from striking.
>
> It shall be unlawful for any person, acting alone or in concert with one or more other persons to compel or attempt to compel any person to join or refrain from joining any labor organization, or to strike or refrain from striking against his will, by any threatened or actual interferences with his person, immediate family, or physical property, or by any threatened or actual interference with the pursuit of lawful employment by such person, or by his immediate family.1/

Hourly earnings in Southwest Georgia are generally lower than average statewide earnings, which are affected by high wages in the Atlanta Metropolitan Area. The hourly earnings of 21 categories of manufacturing workers in Southwest Georgia in 1977 are given in Table 17. The table consists of job code, job title, number of workers in each category, and minimum, maximum, and average hourly earnings. Job titles in the table relate mostly to metal and machinery workers. These hourly earnings are substantially lower than the hourly earnings of northern industrial states in comparable job titles. The information provides a guide to manufacturing wages in Southwest Georgia.

Availability of Material and Supply Requirements

Depending upon the specific product line, the supply and material requirements associated with the food service equipment manufacture can be quite complex. The 44 food service equipment manufacturers who responded to a survey conducted for this study provided some insights into the materials and outside supportive services needed for different products. The materials purchased are

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1/ Acts of 1947, pp. 620, 621. Georgia Code Annotated Sec. 54-804, Harrison Company, Atlanta.

Table 17

HOURLY EARNINGS OF MANUFACTURING WORKERS IN SOUTHWEST GEORGIA, SEPTEMBER 1977

Code	Job Title	No. of Workers	Hourly Earnings		
			Minimum	Maximum	Average
005	Assembler, Machinery	62	$2.70	$4.55	$3.78
115	Die Press Operator	7	2.80	5.59	4.36
182	Drill Press Setup Operator	31	2.30	3.55	2.91
225	Fourdrinier Machine Tender	12	8.73	9.36	9.15
246	Inspector, Line	53	2.30	5.27	3.12
247	Inspector, Quality Control	118	2.30	5.51	4.14
265	Laborer, General	31	2.30	3.82	3.24
266	Lathe Operator	16	3.90	6.10	4.41
267	Layout Man, Metal	4	4.05	6.10	4.59
275	Machine Fixer	53	2.68	5.70	4.56
281	Machinist I	35	2.30	6.10	4.81
283	Maintenance Mechanic II	145	2.90	8.35	6.10
294	Finisher, Metal	22	2.40	4.38	3.83
313	Packager, Machine	448	2.30	6.47	5.81
319	Painter, Spray I	37	2.40	4.55	3.73
339	Presser, Machine	57	2.30	3.86	3.01
347	Punch Press Operator	145	2.30	4.55	3.46
366	Roving Frame Tender	7	3.80	4.18	4.06
393	Sheet Metal Worker	21	3.00	6.10	3.91
464	Tool and Die Maker, Metal	6	4.50	6.15	5.26
515	Welder, Arc	95	3.20	6.10	4.02

Source: Georgia Manufacturing Wage Rates, Georgia Department of Industry and Trade, Atlanta, September 1977.

listed in Appendix 16, and the outside supportive services required are presented in Appendix 17. A summary of these required materials and services is given below.

Materials purchased:

Stainless steel	Motors	Vinyl	Iron
Cold rolled sheet	Burners	Foam	Aluminum
Aluminized steel	Pumps	Particleboard	Copper
Steel plate	Hoses	Fiberboard	Brass
Galvanized steel	Tubings	Cartons	Glass
Chrome steel	Valves	Plastics	Rubber
	Pipes	Resins	Kaolin
	Timers	Paints	Sand
	Various parts and components	Wax	Clay
			Wood
			Cotton

Supportive services required:

Welding	Casting
Stamping	Brazing
Molding	Extruding
Forging	Tool and die making
Plating	Foundry
Coating	Porcelainizing
Enameling	

Nearly all of these materials and services can be obtained in Georgia or in the neighboring states. The seven southeastern states produce a substantial amount of steel and steel products. In the seven southeastern states, there were 66 primary steel furnaces, 9 intermediate steel plants, 51 finishing steel mills, and 35 steel fabricating plants in 1974. Details concerning these mills and their capacities are given in Appendix 20.

However, most food service equipment manufacturers purchase their steel materials from metal service centers, rather than directly from steel mills. According to the Dun and Bradstreet Metalworking Directory, the number of metal service centers, machinery job shops, foundries, castings, forgings, stampings, etc., in Alabama, Florida, and Georgia are presented in Table 18. In this table, standard industrial classification (SIC), service or product, and the number of establishments under each SIC in respective states are given. The approximate locations of these establishments in each state are delineated in Maps 3 to 9. The large number of metal service centers, job shops, and other services offered in the three-state area would assure the availability of metal products and services to any food service equipment plant locating in Southwest Georgia.

Table 18

NUMBER OF METAL SERVICE ESTABLISHMENTS IN ALABAMA, GEORGIA, AND FLORIDA, 1977

SIC	Service or Product	Alabama	Georgia	Florida
3321	Gray Iron Foundries	37	11	5
3322	Malleable Iron Foundries	5	1	1
3324	Steel Investment Foundries	2	0	1
3325	Steel Foundries, N.E.C.	6	5	4
3361	Aluminum Castings	15	9	11
3362	Brass, Bronze, and Copper Castings	6	2	8
3369	Nonferrous Castings, N.E.C.	2	-	7
3462	Iron and Steel Forgings	6	-	3
3463	Nonferrous Forgings	1	-	-
3465	Automotive Stampings	1	2	2
3469	Metal Stampings, N.E.C.	21	19	22
3471	Electroplating, Polishing, Anodizing, etc.	11	7	16
3479	Coating, Engraving, etc.	14	2	6
3599	Job Shops (Machinery, Except Electrical)	54	44	63
5051	Metal Service Centers	34	50	56

Source: Dun and Bradstreet Metalworking Directory 1977, Dun & Bradstreet, Inc., New York.

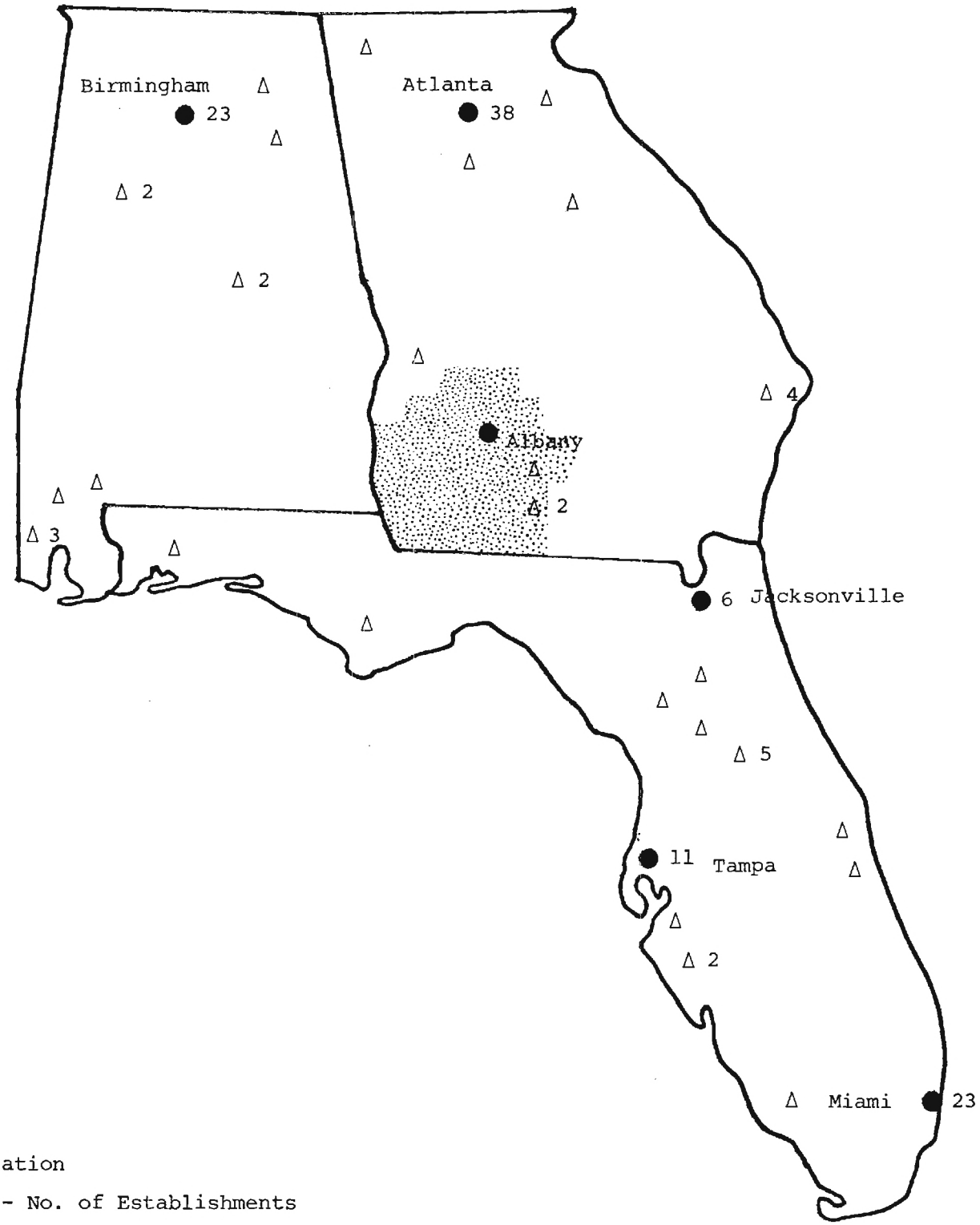
Georgia and the neighboring states are the major producers of lumber and paper products as well as fabrics. The costs of packaging materials such as wooden pallets, crates, cartons, etc., are substantially lower in this area than in the North or West.

Prices of steel products are comparable between southern locations and northern locations. Southern steel mills produce nearly all steel materials used by food service equipment manufacturers, except stainless steel. Because of imports, however, prices of stainless steel in many instances are lower in the South than in the North.

Georgia leads the nation in clay and kaolin production. These two materials are the major inputs for making china, which has a very large market in the United States and the world.

Map 3

DISTRIBUTION OF METAL SERVICE CENTERS IN ALABAMA, FLORIDA, AND GEORGIA

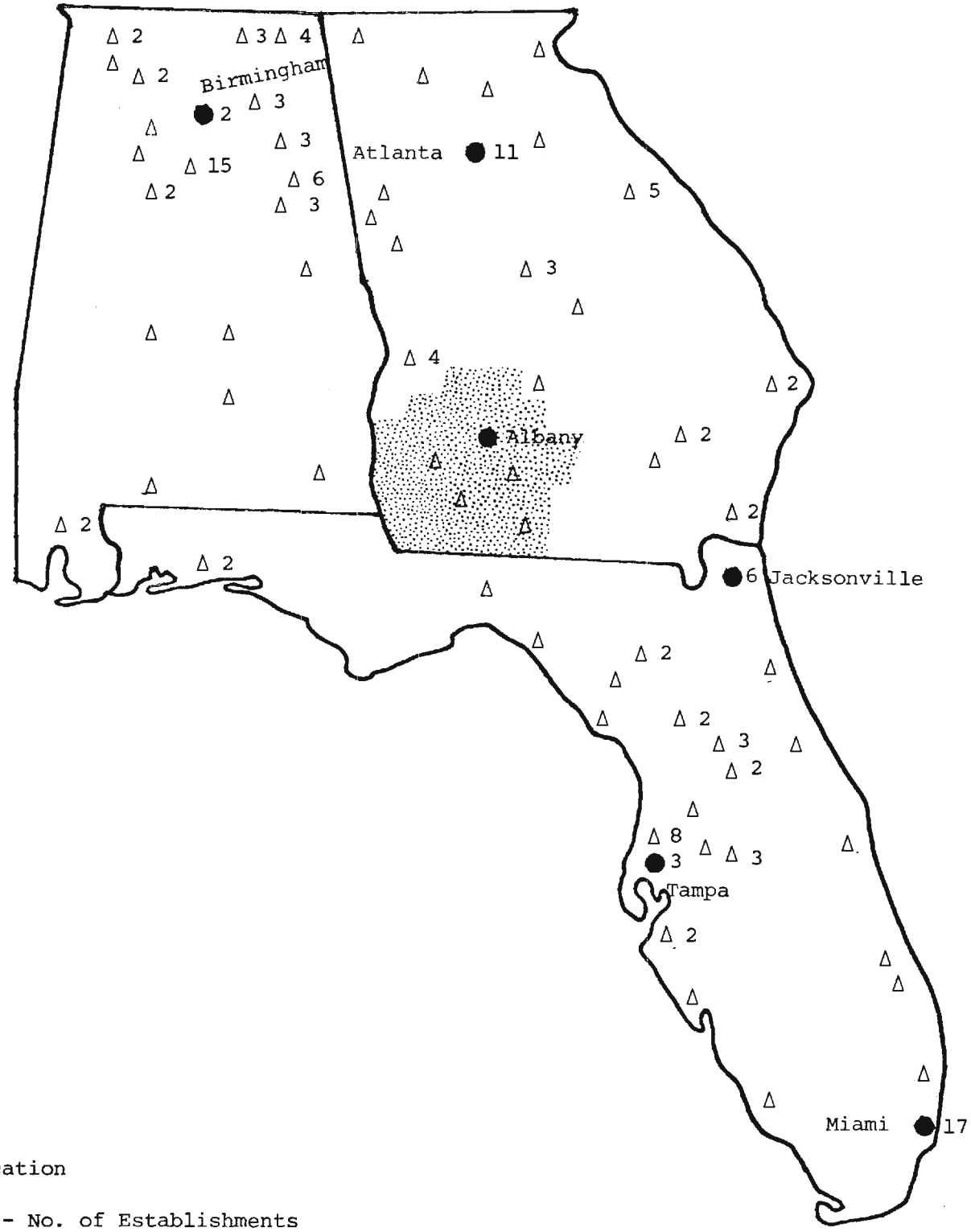


Δ - Location

Number - No. of Establishments

Map 4

DISTRIBUTION OF JOB SHOPS IN ALABAMA, FLORIDA, AND GEORGIA

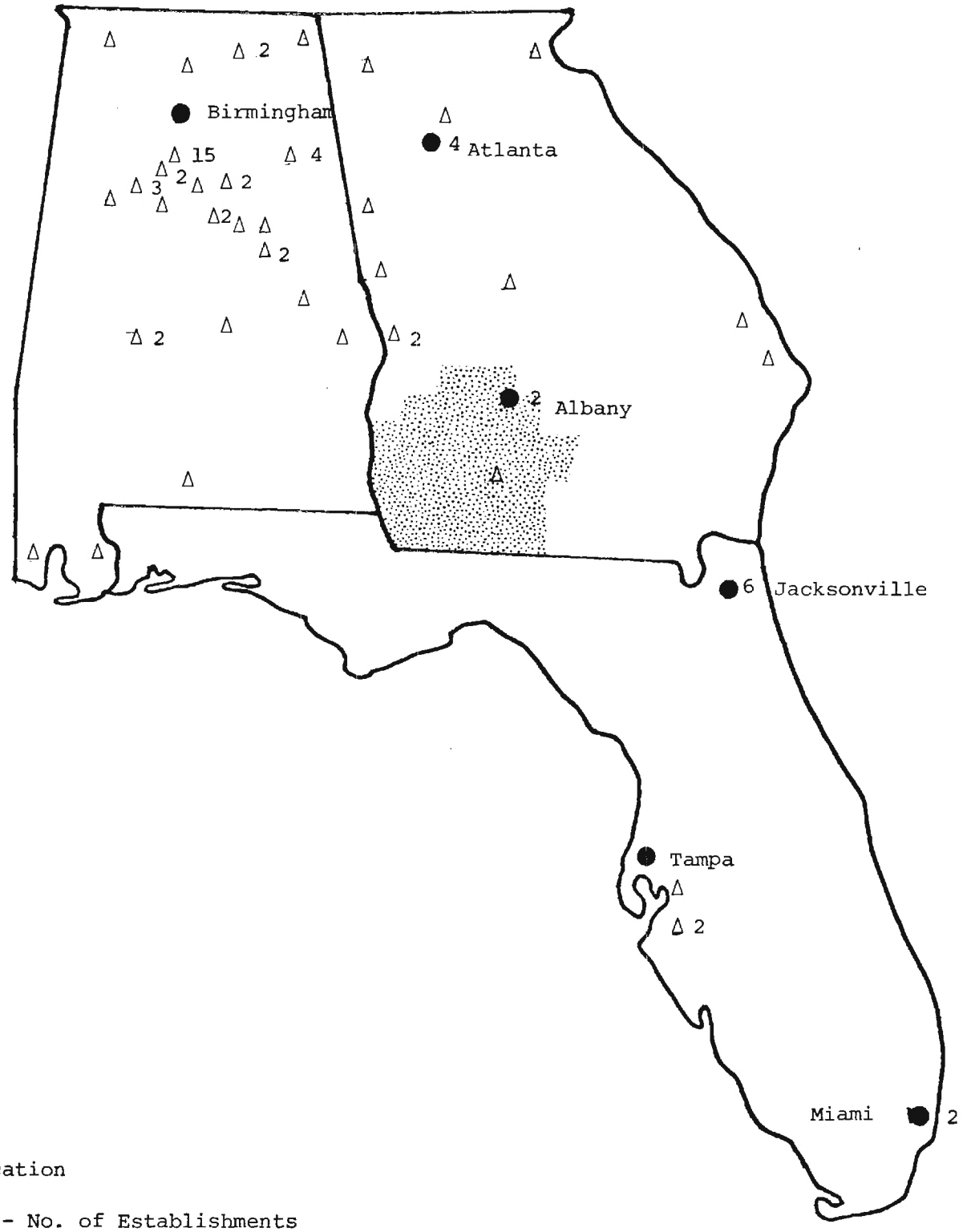


Δ - Location

Number - No. of Establishments

Map 5

DISTRIBUTION OF IRON AND STEEL CASTINGS SERVICES
IN ALABAMA, FLORIDA, AND GEORGIA

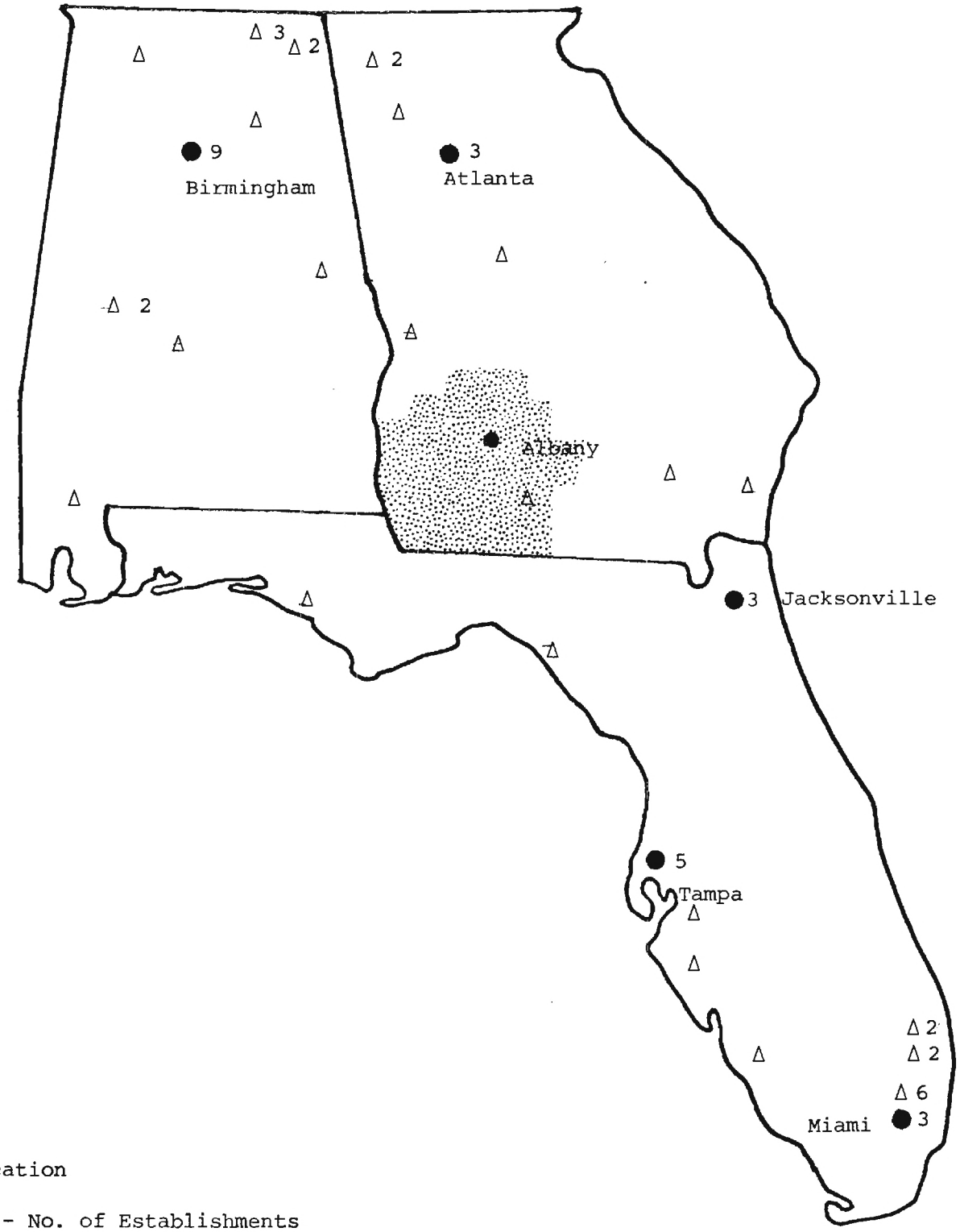


Δ - Location

Number - No. of Establishments

Map 6

DISTRIBUTION OF NONFERROUS CASTING SERVICES
IN ALABAMA, FLORIDA, AND GEORGIA

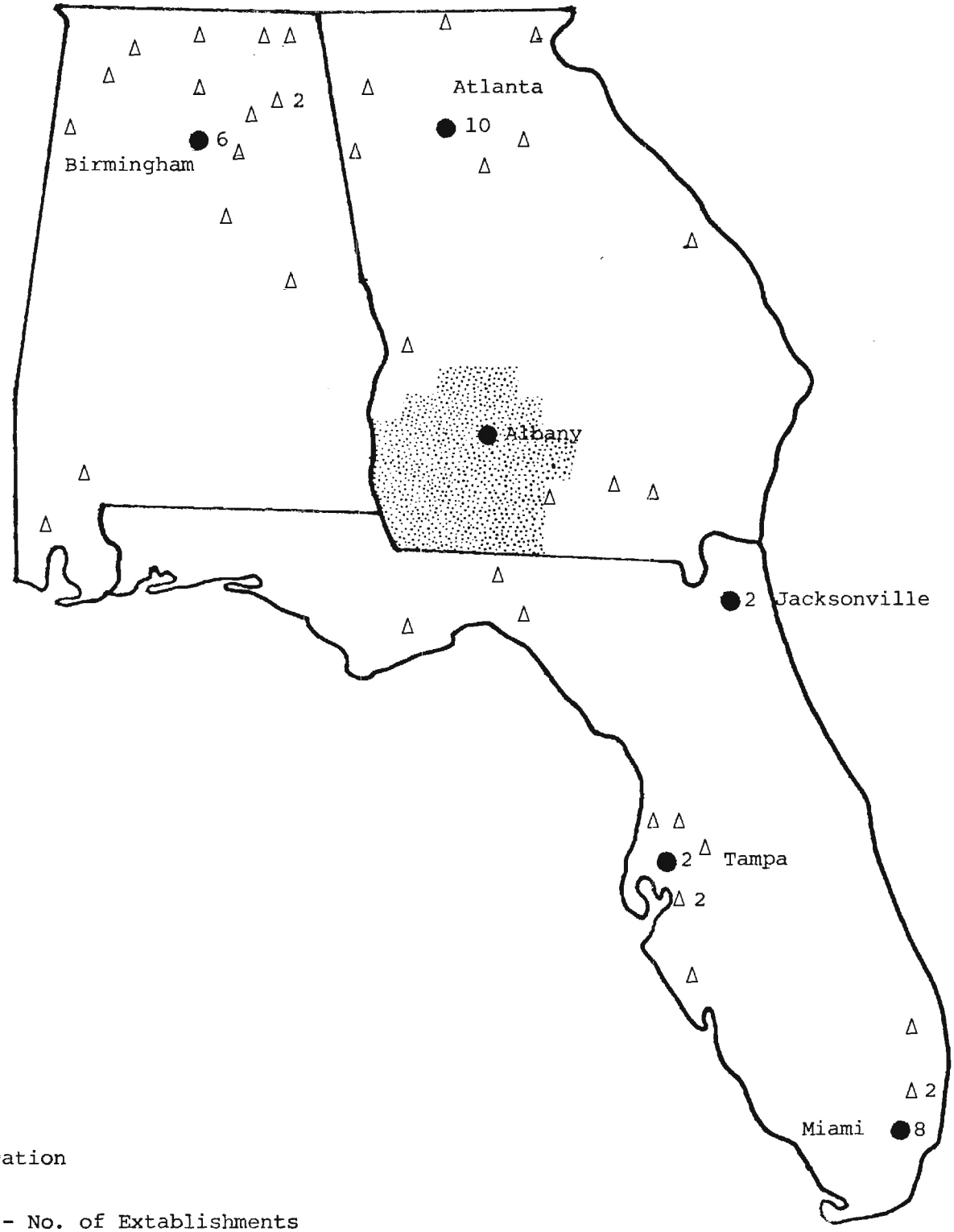


Δ - Location

Number - No. of Establishments

Map 7

DISTRIBUTION OF STAMPING SERVICES IN ALABAMA, FLORIDA, AND GEORGIA

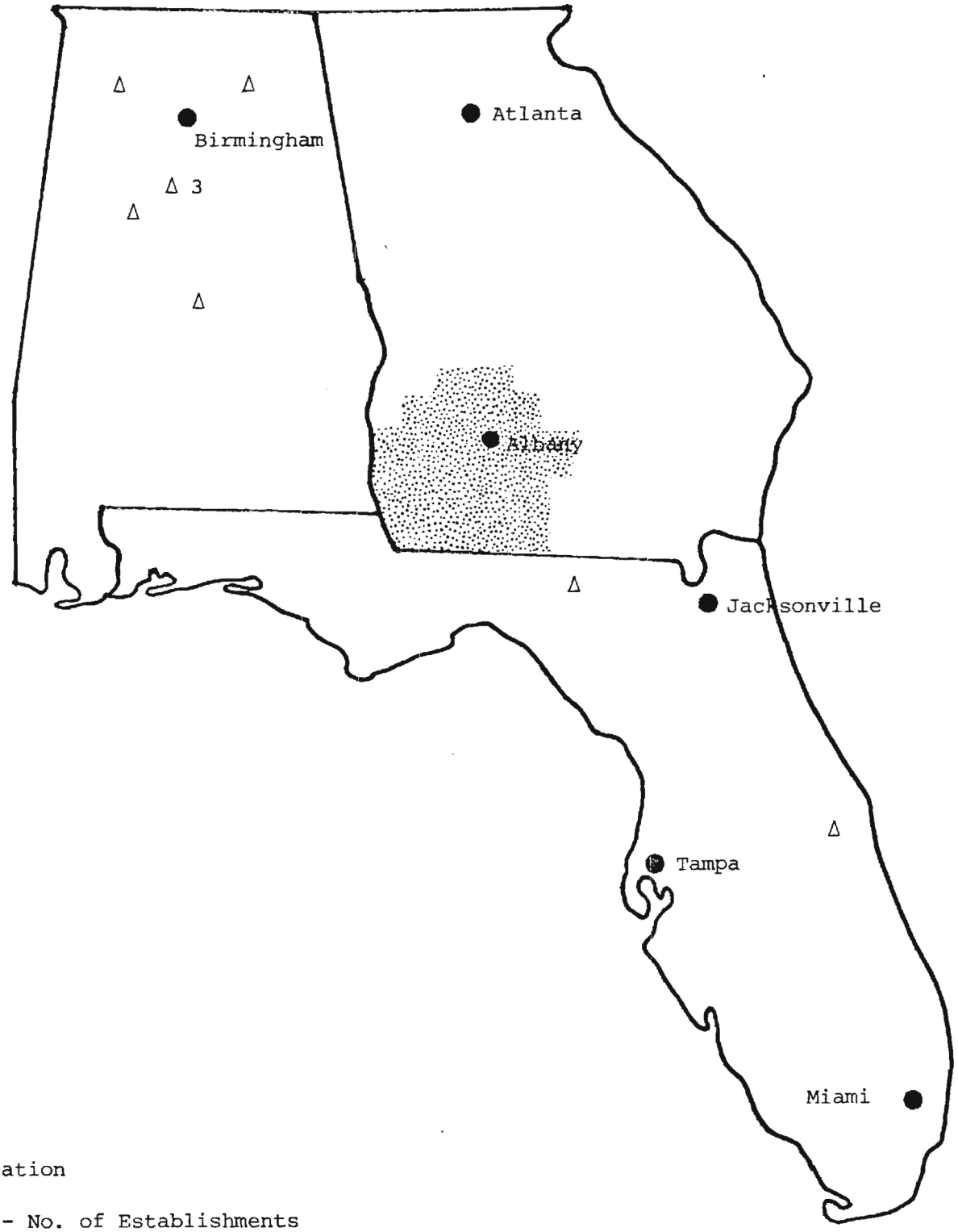


Δ - Location

Number - No. of Extablishments

Map 8

DISTRIBUTION OF FORGING SERVICES IN ALABAMA, FLORIDA, AND GEORGIA

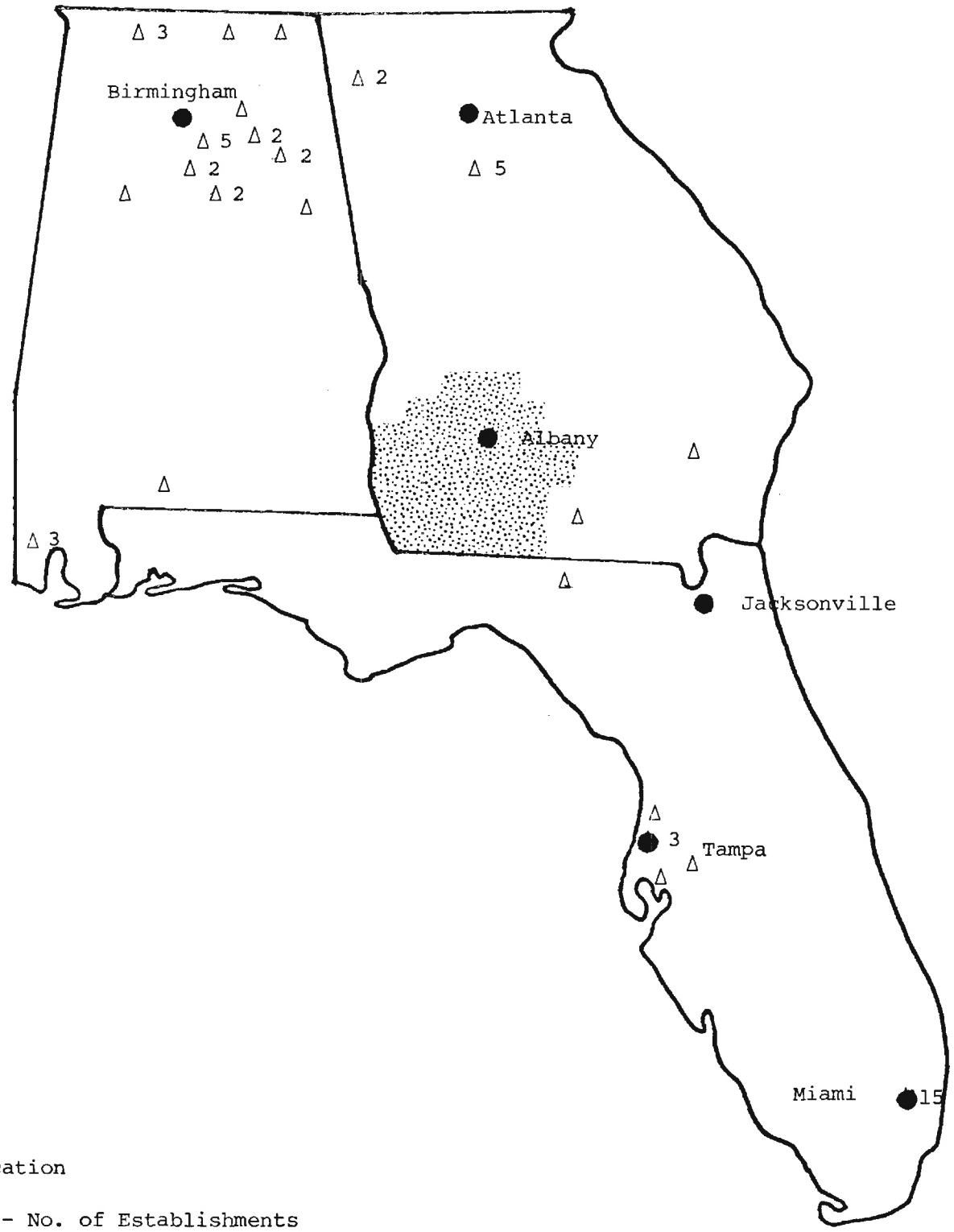


Δ - Location

Number - No. of Establishments

Map 9

DISTRIBUTION OF ELECTROPLATING, POLISHING, ANODIZING, COATING, AND ENGRAVING SERVICES IN ALABAMA, FLORIDA, AND GEORGIA



Δ - Location

Number - No. of Establishments

Availability of Transportation Requirements

Most food service equipment manufacturers serve regional, national, or even international markets. Consequently, the availability of transportation facilities becomes an important factor to be considered in the location of a food service equipment plant. Based on a mail survey conducted for this study, trucks are the primary transportation used for shipments of materials and goods by the food service equipment industry. Rail provides a secondary service, while water transportation is rarely used. Of the 44 respondents to the survey, all used truck, nine used rail, and only one used water transportation. Further information on transportation modes used by the survey respondents is given in Appendix 18.

The distance for both inbound and outbound shipments indicates somewhat the market area of the food service equipment manufacturer. Shipments of less than 1,000 miles were received by 20 out of 26 survey respondents, which indicates that material supplies are obtained mostly from regional sources. Fourteen of 23 replied that their shipments to customers traveled less than 1,000 miles. It appears that a majority of food service equipment manufacturers are active within a 1,000-mile radius, or a regional market. Shipments beyond 1,500 miles to 2,000 miles serve a national market. Additional details on shipment distances by survey respondents are found in Appendix 19.

Two other kinds of service are important to the food service equipment industry -- air transportation and parcel delivery and pickup service. Air transportation is important for executives and sale personnel on business trips. Atlanta, the hub of air transportation in the South, has national connections. Most of the Southwest Georgia locations have their own commercial air service. Parcel delivery and pickup service is important to the food service equipment manufacturer because of the need for fast delivery service on small quantity/volume of materials purchased or goods sold. The United Parcel Service (UPS), as well as bus lines and airlines in most Southwest Georgia locations, provide parcel delivery and pickup service.

Highway, rail, bus, truck, water, and air transportation facilities in Albany, Bainbridge, Thomasville, and Moultrie are outlined in Table 19. The facilities of these four Southwest Georgia locations are given only as representatives of the area. Many other Southwest Georgia locations are equally as desirable, but constraints on the length of this report prohibit their inclusion

Table 19

TRANSPORTATION FACILITIES AT FOUR MAJOR LOCATIONS IN SOUTHWEST GEORGIA

Type of Transportation Facilities	Albany	Bainbridge	Thomasville	Moultrie
(1) Highways				
Federal (Highway No.)	19, 82	27, 84	19, 84, 319	319
State (Highway No.)	3, 91, 133, 234, 257	97, 253, 309, 311, 312	122, 202	33, 37, 111, 133
Distanct to Nearest Interstate	41 miles (I-75)	78 miles (I-75)	33 miles (I-75)	22 miles (I-75)
(2) Rail				
Lines Serving	Seaboard Coast Line Southern Railway System	Seaboard Coast Line	Seaboard Coast Line	Seaboard Coast Line Southern Railway
Piggyback Service	Yes	Yes	Yes	Yes
(3) Bus				
Line Serving	Trailways	Trailways	Trailways	Trailways
(4) Truck				
No. of Motor Freight Carriers				
Interstate	19	9	10	15
Intrastate	4	2	2	3
Local Terminals	16	3	3	1
(5) Water				
Navigable River	Flint River at Bainbridge	Flint River	Flint River	Flint River
Distance	60 miles	Local	35 miles	52 miles
Nearest Seaport	Brunswick, Ga.	St. Joe, Fla.	St. Joe, Fla.	Brunswick, Ga.
Distance	172 miles	100 miles	150 miles	148 miles
(6) Air				
Nearest Commercial Air Service	Albany - 4 miles	Tallahassee, Fla. - 38 miles	Moultrie - 19 miles	Moultrie - 7 miles
Name of Airline Serving	Southern Airways	Eastern, National	Southern Airways	Southern Airways

Source: Economic Development Profile, Georgia Department of Community Development, Atlanta.

here. Very good truck and rail service is available because of the number of rail, bus, and trucklines serving the area. Map 1 illustrates the transportation system in the Southwest Georgia area.

Availability of Power and Fuel Requirements

During the last two winters at the height of power and fuel shortage throughout the northern industrial belt, all manufacturing plants in Southwest Georgia operated normally without the adverse effects of bad weather or power and fuel shortages. Generally, power and fuel supplies are not an overriding concern to most food service equipment manufacturers (under normal conditions), because their requirements are not too large on the average. Electrical power, the most important utility need by the food service equipment manufacturer, is supplied by the Georgia Power Company, with sufficient capacity to take care of any new manufacturing in the foreseeable future. Gas is used largely for heating purposes in food service equipment plants. Because of Southwest Georgia's year-round gentle climate, the requirement for gas in the manufacture would be minimal. However, the supply is there if needed. Oil is required by only a small percentage of food service equipment plants; a supply of fuel oil does exist in Southwest Georgia.

Accessibility to Markets

Accessibility to markets depends upon two elements -- (1) the distance to markets plus the availability of a transportation system and (2) relative production costs. As shipping distances increase, transportation costs rise in most instances. However, production costs can influence the decision to reach a distant market because lowered production costs can more than offset higher transportation costs. Manufacturers have become less concerned with distance to markets and more interested in the result of the total economic situation at a given plant site.

The shifting of market patterns and the relative costs of transportation to product value are two distinct advantages favoring Southwest Georgia. It has been clearly shown in the previous sections that the growth markets for food service equipment and eating and drinking places have changed gradually from the North to the South because of the shifting patterns of population distribution and other economic conditions. The market is thus moving closer to southern manufacturers. The high product value of food service equipment relative

to transportation costs is another important factor to be considered. As discussed earlier in this report, most food service equipment manufacturers have shipped their products on a nationwide basis or to a large regional market, proving that transportation costs alone will not deter reaching distant markets.

The diversity of product designs in food service equipment is great, making it easier to market a product nationally because of the distinctive features that would appeal to a variety of end users.

A simple freight cost analysis, disregarding production costs and product design, is provided in Map 10. The analysis shows a freight break-even line for three hypothetical plants shipping ovens or ranges to 40 major markets in the United States. The three starting points are Albany, Georgia, La Porte, Indiana, and Philadelphia, Pennsylvania. Rates are computed on per hundred weight of the commodities on a truckload basis. These rates together with starting and ending points are given in Table 20.

Albany has a clear freight advantage in all southern states over La Porte and Philadelphia. In mid-western and western states, La Porte possesses distinct advantage in freight costs, leaving a narrow corridor in the Northeast as the area most favorable for Philadelphia. (See Map 10). Readers need to be reminded again that freight costs alone will not be a decisive factor in determining a valid marketing plan. Savings in production costs and other expenses could easily put a food service equipment manufacturer in Southwest Georgia in a strong position to market his products nationally. The next chapter will provide an objective case study on investment requirements and production costs for a model production.

Potential Plant Sites

Most locations in Southwest Georgia have developed their industrial district or industrial park with roads, rail connections, and utilities. Privately developed and undeveloped land are excluded in this report. Albany, Bainbridge, Thomasville, and Moultrie in the area are used again for illustration purposes. Only very brief information on each industrial park is offered here; detailed information may be obtained by contacting local development authorities, the Southwest Georgia Area Planning and Development Commission, Camilla, Georgia, or the Georgia Department of Industry and Trade, Atlanta.

Map 10

FREIGHT BREAK-EVEN LINES FOR LA PORTE, IND., PHILADELPHIA, PA., AND ALBANY, GA., FOR SHIPMENTS OF FOOD SERVICE EQUIPMENT, 1978

Table 20

MOTOR FREIGHT RATES FOR ELECTRIC OR GAS RANGES OR OVENS IN THE UNITED STATES, 1978[1/]
(In cents per hundred weight)

To	From		
	Albany, GA	La Porte, IN	Philadelphia, PA
Birmingham, AL	154	284	333
Phoenix, AZ	672	637	771
Little Rock, AR	278	302	441
Los Angeles, CA	811	775	1,021
San Francisco, CA	811	775	1,021
Denver, CO	529	421	582
Hartford, CT	385	349	184
Washington, DC	307	309	166
Miami, FL	227	443	401
Tampa, FL	169	402	368
Atlanta, GA	103	290	307
Chicago, IL	339	113	349
Indianapolis, IN	304	133	327
New Orleans, LA	213	347	410
Baltimore, MD	318	309	150
Boston, MA	405	360	217
Detroit, MI	344	144	301
Minneapolis, MN	467	263	423
St. Louis, MO	299	180	377
Jackson, MS	199	309	385
Kansas City, MO	402	271	423
Newark, NJ	357	349	150
Buffalo, NY	368	194	240
New York, NY	357	349	150
Greensboro, NC	215	309	216
Columbus, OH	314	161	276
Oklahoma City, OK	361	388	515
Portland, OR	811	775	1,021
Philadelphia, PA	337	327	-
Pittsburgh, PA	347	193	227
Providence, RI	401	360	201
Greenville, SC	178	304	270
Knoxville, TN	187	244	279
Memphis, TN	213	259	368
Dallas, TX	335	427	519
Houston, TX	330	450	530
San Antonio, TX	370	478	566
Norfolk, VA	257	357	195
Seattle, WA	811	775	1,021
Milwaukee, WI	356	143	360

1/ Rates per cwt. on electric or gas ranges or ovens - per Item 26740, 27450, and 27520, National Motor Freight Classification 100-D - Truckload Class 45.

Source: Georgia Freight Bureau, Inc., Atlanta, January 20, 1978.

A selected list of industrial parks in Southwest Georgia is given below:

(1) ALBANY SOUTHERN INDUSTRIAL DISTRICT, Albany, Georgia

Location: At West Albany, Georgia, south and adjacent to the city limits.

Total acres in site: 550

Total available acres: 315

Utilities: Electricity, gas, sewer, water, and fire protection

Transportation: Roads and rail connections

Owner: Southern Railway System

Contact: James C. Cook, Manager
Industrial Properties
Southern Railway System
99 Spring St., S. W., Room 804
Atlanta, Ga. 30303
Phone: (404) 688-0800

(2) ALBANY INDUSTRIAL PARK, Albany, Georgia

Location: Adjacent to south city limits of Albany

Total acres in site: 85

Total available acres: 85

Utilities: Electricity, gas, sewer, water, and fire protection

Transportation: Roads and rail connections

Owner: Seaboard Coast Line Railroad

Contact: J. Ross Le Grand
Seaboard Coast Line Railroad
500 Water St., Room 926
Jacksonville, Fla. 32202
Phone: (904) 353-2011

(3) DECATUR COUNTY INDUSTRIAL AIR PARK, Bainbridge, Georgia

Location: 5 miles northwest of Bainbridge on U. S. 27.

Total acres in site: 500

Total available acres: 300

Utilities: Electricity, gas, sewer, water, and fire protection

Transportation: Roads and rail connections

Owner: Decatur County

Contact: Thomas A. Larson, Executive Director
Bainbridge-Decatur County Chamber of Commerce
P. O. Box 736, Bainbridge, Ga. 31717
Phone: (912) 246-4774

(4) ROSE CITY INDUSTRIAL DISTRICT, Thomasville, Georgia

Location: Industrial Boulevard, Thomasville, Georgia

Total acres in site: 217

Total available acres: 105

Utilities: Electricity, gas, sewer, water, and fire protection

Transportation: Roads and rail connections

Owner: City of Thomasville

Contact: Lloyd E. Eckberg, Executive Vice-President
Thomasville-Thomas County Chamber of Commerce
P. O. Box 560, Thomasville, Ga. 31792
Phone: (912) 226-1131

(5) GATEWAY COMMERCIAL PARK, Thomasville, Georgia

Location: Corner of U. S. 19 and U. S. 319, within the city limit

Total acres in site: 150

Total available acres: 74

Utilities: Electricity, gas, sewer, water, and fire protection

Transportation: Roads and rail connections

Owner: McKinnon Realty Co., Thomasville, Ga. 31792

Contact: Lloyd E. Eckberg, Executive Vice President
Thomasville-Thomas County Chamber of Commerce
P. O. Box 560
Thomasville, Ga. 31792
Phone: (912) 226-1131

(6) MOULTRIE-COLQUITT COUNTY INDUSTRIAL PARK, Moultrie, Georgia

Location: Moultrie-Lenox Post Road

Total acres in site: 435

Total available acres: 118

Utilities: Electricity, gas, sewer, water, and fire protection

Transportation: Roads and rail connections

Contact: George A. Hanson
Moultrie Chamber of Commerce
P. O. Box 487
Moultrie, Ga. 31768
Phone: (912) 985-2131

Industrial Financing Assistance and Employee Training Programs

One of Georgia's strong points in attracting new industries is the industrial financing assistance and employee training programs available. Packages of financial support to new industries are available through the various development agencies. Depending on the needs of the particular company, the

development agency staff can put together appropriate financial packages. Some noteable financial support programs operating in the state are described below:

- o Industrial Revenue Bonds
  Available throughout the state to qualified companies, revenue bonds have a 1% to 2% interest advantage over conventional loans. Used primarily by manufacturers, they allow 100% financing of buildings, land, equipment, and financing costs. A $5 million limit exists on revenue bonds for any one project, except for pollution control issues which have no limit. In recent years, industrial revenue bonds issued in the state exceeded $100 million annually.

- o Business Development Corporation
  The Georgia Business Development Corporation is a private, state-chartered corporation whose membership includes banks, savings and loan associations, utilities, and insurance companies. Used primarily by manufacturers unable to obtain conventional financing, Business Development Corporation loans range from $50,000 to $250,000 for time periods up to 15 years.

- o Local Development Corporations
  Established as private corporations by local business leaders, over 200 local development corporations throughout Georgia provide local and Small Business Administration 502 loan funding for qualified manufacturers.

- o Federal Lending Agencies
  Three federal agencies have business loan programs in the state -- Small Business Administration, Farmers Home Administration, and Economic Development Administration.

- o International Banks
  New state law permitting international banking activities has led to Atlanta offices for Barclays Bank and Swiss Creditbank, with others expected to follow.

The unchallenged financial center of the Southeast, Atlanta boasts three of the nation's top 100 banks, and the Federal Reserve Bank's Sixth District headquarters.

Georgia has a number of productive sources for business financing. The two most valuable sources probably are industrial revenue bonds and loans from the Georgia Business Development Corporation.

Georgia offers without charge to new and expanding companies, an exceptional employee training program -- Quick Start. A summary of the Quick Start program follows.

- o Consultation and Analysis

  When a company selects a Georgia plant site, an industrial training team visits the home plant to consult with key company officials. Together, they determine the company's manpower needs, job requirements, and start-up schedule.

- o The Training Plan

  Georgia's training coordinators then design a training plan for the company's approval. The plan spells out each course's content, goals, start and completion dates, location, and methods for recruiting and selecting trainees.

- o Training Facilities and Equipment

  Training facilities are set up in the area vo-tech school, or if more convenient to the plant site, in special facilities rented by the State of Georgia. All facilities are equipped with production machinery comparable to the company's. Quick Start programs can draw on over $25 million in equipment holdings from Georgia's 32 area vo-tech schools. Many Quick Start programs use both state and company equipment.

- o Instruction

  Georgia selects and pays competent, qualified instructors to conduct training classes. In most cases, company personnel are borrowed to teach highly specialized skills.

- o Trainees

  Local offices of the Georgia Department of Labor and the area vo-tech school recruit, test, and screen prospective employees in accordance with company specifications. Trainees attend training sessions on their own time, without any training allowance or other compensation.

Four vocational-technical schools are located in Southwest Georgia. The locations, enrollments, and number of graduates of these four schools are given in Table 21.

Table 21

ENROLLMENT AND GRADUATES OF FOUR VOCATIONAL-TECHNICAL SCHOOLS IN SOUTHWEST GEORGIA, 1975-1976

Location	Enrollment[1/]		Graduates	
	Day	Evening	Day	Evening
Albany	1,337	2,914	353	1,912
Moultrie	512	1,964	282	699
Thomasville	877	1,991	247	1,612
Bainbridge	55	218	23	177

1/ Unduplicated cummulative enrollment.

Source: Southwest Georgia Area Planning and Development Commission.

A MODEL PRODUCTION

Two purposes in this study were served in setting up a model production of food service equipment: (1) to demonstrate the investment and production requirements and (2) to compare the similarities and differences in costs between a Southwest Georgia location and an out-of-state location. Exhaustive efforts were made in obtaining data related to product mix, plant locations, input-output relationships, and costs of labor and materials. All cost data were obtained during a five-month period, October 1977 to February 1978.

Albany, Georgia, and a location in the Great Lakes area were chosen for the comparison. The following sections deal with end products and plant capacity, capital costs, production costs, and projected returns.

End Products and Plant Capacity

The model production is designed to manufacture different kinds of ranges, ovens, and steam kettles. The number of units produced in a normal year are given below as the base for planning production facilities, capital outlays, and production costs.

Kind	Units per Year
Electric Ranges	10,028
Bake Ovens	2,305
Pizza Ovens	5,188
Steam Kettles	1,153
Total	18,674

A simplified production flow diagram depicting the production procedure is given in Figure 5. The flow shows that the materials are received and stored, moved through product processing and assembly lines, finished with paint, packed and crated, and finally stored and shipped.

The model production requires approximately 120,000 square feet of floor space. The layout for the production is shown in Figure 6. The pattern of the layout is generally consistent with the flow diagram but with specific location and dimensions assigned to each job area.

Figure 5

SIMPLIFIED PRODUCTION FLOW DIAGRAM FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

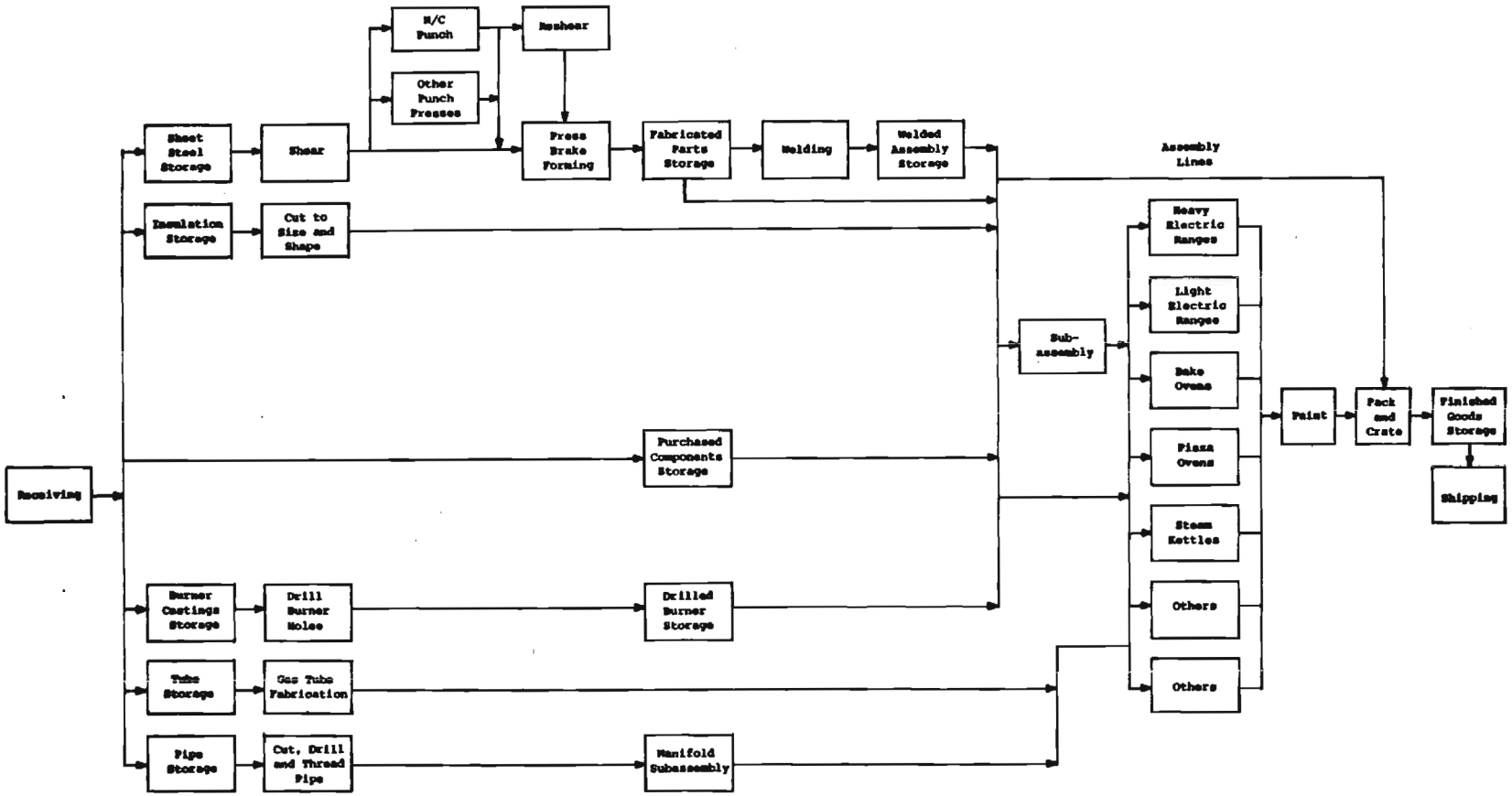
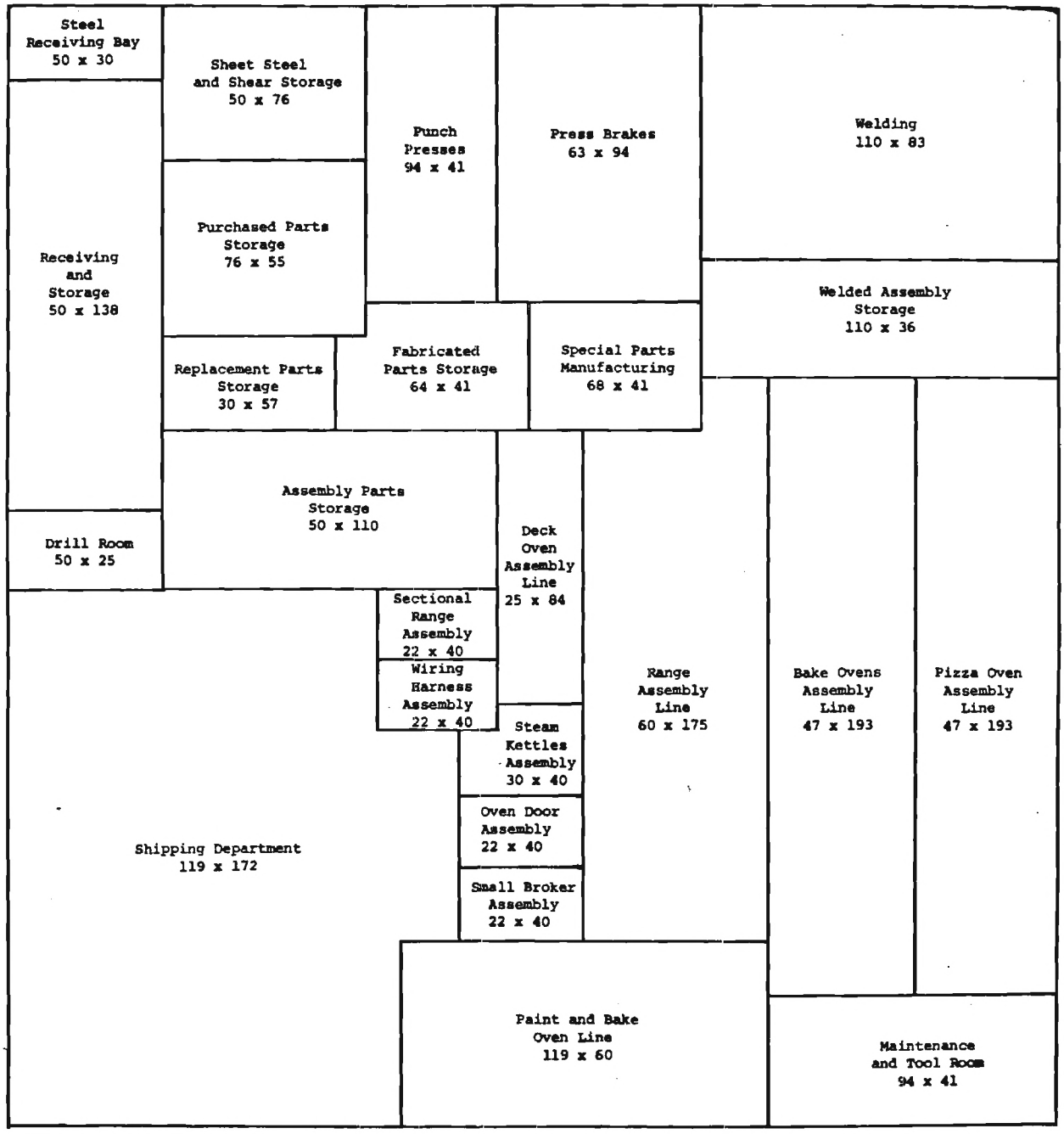


Figure 6

LAYOUT FOR A COMMERCIAL RANGE, OVEN, AND STEAM KETTLE'S PLANT



Square Foot Total = 120,000 = 340 Feet by 353 Feet.

Capital Costs

All capital requirements for the model production, as indicated in the previous section, are estimated and presented here. Capital costs consist of fixed capital outlays as well as working capital.

Fixed Capital Requirements. Fixed capital requirements include land, access road and parking lot, buildings, machinery and equipment, materials handling and transporting equipment, laboratory equipment, installation and erection, engineering, contingency, and interest cost during construction period. These fixed investment costs are given in Table 22 for the Albany location and for the Great Lakes location. The total fixed capital costs are estimated at $3,121,473 for Albany and at $3,787,050 for the Great Lakes location. A detailed breakdown of these costs and descriptions is presented below.

Table 22

ESTIMATED FIXED INVESTMENT REQUIREMENTS
FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT
AT AN ALBANY, GEORGIA, AND A GREAT LAKES LOCATION

Item	Albany	Great Lakes
Land, 11 Acres	$ 165,000	$ 330,000
Buildings		
Plant	1,491,585	1,848,943
Office	88,237	110,106
Access Road and Parking Lot	43,400	54,250
Machinery and Equipment	634,036	634,036
Materials Handling and Transporting Equipment	147,910	147,910
Laboratory Equipment	5,805	5,805
Installation and Erection	42,500	50,000
Engineering Expenses	185,000	222,000
Contingency	156,000	188,000
Interest Cost during Construction Period	162,000	196,000
Total	$3,121,473	$3,787,050

1. *Land.* An estimated 11 acres are necessary for buildings, parking lot, and access roads, including space for future expansion. Land cost in a

developed industrial district is estimated roughly at $15,000 per acre in Albany, Georgia, and at $30,000 per acre in a Great Lakes location.[1/]

2. *Access Road and Parking Lot*

Blacktop-paved access road to main highway, 25 ft. x 300 ft.

Blacktop-paved employee parking lot, 80 ft. x 100 ft.

Albany: $2.80/sq. ft. blacktop

(300)(2.80)(25) + (80)(2.80)(100) = $43,400

Great Lakes: $3.50/sq. ft. blacktop

(300)(3.50)(25) + (80)(3.50)(100) = $54,250

3. *Buildings*

	Square Feet
Plant space requirements	
(1) Fabrication areas	16,838
(2) Welding areas	9,120
(3) Assembly areas	41,180
(4) Parts' storage areas	22,944
(5) Shipping warehouse	21,888
(6) Replacement parts, storage, and packaging	2,688
(7) Tool room and maintenance	4,860
Total	119,518

Plant cost is computed for a prefabricated metal building with the following features: 20-foot ceiling, sprinkler system, loading dock, heating, electricity, lighting, insulation, and air conditioning. Cost per square foot is estimated at $12.48 for Albany and $15.47 for the Great Lakes area.

Albany: 119,518 sq. ft. x $12.48 = $1,491,585

Great Lakes: 119,518 sq. ft. x $15.47 = $1,848,943

The two-story office building contains 6,400 square feet of space, is constructed of tilt-up concrete, and is centrally air conditioned and fully lighted. Cost estimates are given below.[2/]

1/ Information on land costs was supplied by the Lawyers Title Insurance Company.

2/ Building costs are based on the Dodge Building Cost Calculation and Valuation Guide, F. W. Dodge Company, Division of McGraw-Hill, Inc., data valid to March 31, 1977.

	Square Feet	Albany Unit Cost	Albany Total	Great Lakes Unit Cost	Great Lakes Total
First floor	3,200	$16.22	$51,904	$20.24	$ 64,768
Second floor	3,200	16.22 x 0.7	36,333	20.24 x 0.7	45,388
Total	6,400		$88,237		$110,106

4. *Machinery and Equipment.* The machinery and equipment required in the model production are listed in this section. Number of machinery units, estimated unit cost, and total costs are given below. The cost difference between Albany and Great Lakes is insignificant. These costs were valid in November 1977.

Number	Item and Description	Estimated Cost Per Unit	Estimated Cost Total
1	Shear - Cincinnati, 12 foot, 10 gauge	$ 30,137	$ 30,137
1	Shear - Wysong, 12 foot, 1/4 inch	36,225	36,225
1	Shear - Lodge & Shipley, 4 foot, 12 gauge	6,000	6,000
2	Punch Press - Strippit N/C, F/1000, 30 ton, 20 Stations	130,000	260,000
1	Punch Press - Strippit Super 30, 30 ton,5/8" stroke	27,500	27,500
1	Punch Press - Straight side, bed 66" x 42", 75 ton, 6" stroke	15,000	15,000
3	Punch Press - OBI, 32" x 21", 60 ton, 6" stroke	23,000	69,000
1	Press Brake - Dreis & Krump, 12 foot, 65 ton	32,000	32,000
2	Press Brake - Dreis & Krump, 8 foot, 55 ton	17,000	34,000
2	Press Brake - Verson, 8 foot, 65 ton	23,000	46,000
1	Press Brake - Dreis & Krump, 4 foot, 15 ton	6,000	6,000
2	Mig Welder - Linde, 250 Amps	2,100	4,200
2	Arc Welder - Lincoln, 250 Amps	600	1,200
2	Heli-Arc - Miller, 15.2 KVA	2,837	5,674
2	Spotwelder - Peer, 75 KVA	4,500	9,000
2	Spotwelder - National, 50 KVA	7,800	15,600
3	Spotwelder - Taylor-Winfield (Portable), 50 KVA	6,600	19,800
1	Projection Welder - Sciaky, 75 KV	2,600	2,600
1	Paint Booth (used) - Devilbiss	4,500	4,500
1	Paint Bake Oven - Devilbiss MDLG0505	7,700	7,700
1	Paint Heater - Devilbiss MH-602	1,200	1,200
1	Spray Gun & Tank	700	700
	Total		$634,036

5. *Materials Handling and Transporting Equipment.* The equipment for materials handling and transporting is given together with estimated cost. All items listed, except the Dodge Van, are forklift trucks. Costs were validated

in November 1977. There is no significant cost difference between Albany and a Great Lakes location.

Number	Forklift Trucks and Van	Estimated Cost
1	Clark 5000#	$ 11,345
1	Clark	17,201
1	Clark	17,473
1	Crown 1500#	3,189
1	Namco LP 2000#	6,733
1	Towmotor Gas 5000#	10,992
1	Clark Utility Truck	12,764
1	Yale Propane 3000#	11,526
1	Clark LP 2500#	9,749
1	Towmotor Gas 4000#	9,574
1	Towmotor Propane 4000#	9,574
1	Yale Propane 3000#	11,575
1	Yale Electric 3000#	11,925
1	Dodge Van	4,290
	Total	$147,910

6. *Laboratory Equipment.* Various types of hand tools and equipment used for testing and quality control purposes are estimated at $5,805 for both Albany and a Great Lakes location.

7. *Installation and Erection Expenses.* The amount estimated for labor, materials, and related services in installing all equipment and machinery is $42,500 for Albany and $50,000 for a Great Lakes location.

8. *Engineering Expenses.* The engineering function includes the preparation of all flow diagrams and layouts and the drawing up of equipment and construction specifications with detailed blueprints. The engineering function also includes the issuing of tenders for equipment and buildings, evaluation of bids entered by contractors, and the negotiation and finalizing of contracts with contractors. Once contracts for equipment and buildings have been granted, it is necessary to maintain an inspection and expediting service to ensure that the equipment and buildings are, in fact, being built in accordance with specifications and the schedule of delivery date is maintained. The costs of an engineering study are estimated at $185,000 for Albany and at $222,000 for a Great Lakes location, or about 6% of most fixed capital outlays.

9. *Contingency.* Provisions are made for unexpected delays, poor work scheduling, or late deliveries. About 5% of the total fixed investment is slated for this purpose, with Albany at $156,000 and Great Lakes at $188,000.

10. *Interest during Construction Period.* It was estimated that 12 months will be required to construct the proposed plant with all equipment and facilities installed. Progress payments on contracts and equipment orders will have to be met by equity funds and short-term or long-term borrowing. A significant portion of the capital outlay during the construction period will have to come from short-term borrowing. These costs are usually capitalized to reflect the true costs of getting the facilities into operation.

Total fixed capital requirements are estimated at $3,121,473 for the Albany location and at $3,787,050 for the Great Lakes location. It was decided that one third of these funds would come from equity funding and two thirds would be from short-term loans for various lengths of time at an interest rate of 10%. Interest costs are estimated at $162,000 for the Albany location and at $196,000 for the Great Lakes Location.

Working Capital. Estimated working capital for the model production is given in Table 23. Working capital is estimated on the basis of materials and supplies for 12 weeks, finished products for three weeks, accounts receivable for five weeks, and a cash reserve. The variation of working capital requirements between Albany and the Great Lakes area is slight because product prices are the same and the difference in materials costs is small. Total working capital is estimated at $2,952,000 for Albany and $3 million for the Great Lakes location.

Table 23

ESTIMATED WORKING CAPITAL REQUIREMENTS
FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

Item	Albany	Great Lakes
Materials and Supplies	$ 592,000	$ 612,000
Finished Products	660,000	660,000
Receivables	1,100,000	1,100,000
Cash Reserve	600,000	628,000
Total	$2,952,000	$3,000,000

Total capital requirements for the model production include fixed capital investment and working capital. These requirements are estimated at approximately $6 million for Albany and close to $6.8 million for the Great Lakes location. (See Table 24.)

Table 24

ESTIMATED TOTAL CAPITAL REQUIREMENTS
FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

Item	Albany	Great Lakes
Fixed Capital Investment	$3,121,473	$3,787,050
Working Capital	2,952,000	3,000,000
Total	$6,073,473	$6,787,050

Production Costs

Production costs consist of variable costs and fixed costs. Variable costs are those which vary in accordance with the level of production. Fixed costs are those which remain constant and are not influenced by the level of production under normal operating conditions. These two categories of costs are estimated for the model production.

Variable Costs. Variable costs for the model production are raw materials, labor, utilities, and miscellaneous. Detailed calculations for each cost element are given separately.

1. *Raw Materials.* Major materials used in the production are four types of sheet steel, gray iron castings, steel plate, insulation materials, enamel, wire oven racks, bright nickel plating, and crates. According to detailed specifications obtained for these materials, prices were quoted from various suppliers in the Albany area as well as in the Great Lakes area. Type of materials used, annual volume, unit cost and total costs for the Albany area and for the Great Lakes area are given in Table 25. There are some differences in unit costs between Albany and Great Lakes. However, the difference in total materials costs is very small. The annual materials costs are estimated at $2,563,434 in the Albany area and at $2,651,562 in the Great Lakes area.

2. *Labor.* Approximately 134 workers are required to operate the model production for one 8-hour shift per day, 240 days per year. Wage rates are based on current rates prevailing in the two areas plus 28% fringe benefits in the Albany location and 40% in the Great Lakes area. The number of workers for each job, hourly wage and total annual wage, plus fringe benefits are provided in Table 26. Total labor costs were estimated at $1,713,920 for the Albany

Table 25

ESTIMATED ANNUAL RAW MATERIALS COSTS
FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

Item	Volume/Year	Albany		Great Lakes	
		Unit Cost	Total	Unit Cost	Total
Sheet Steel					
Cold Rolled	5,400,000 lbs.	$ 0.185	$ 999,000	$ 0.188	$1,015,200
Aluminized	384,000 lbs.	0.225	86,400	0.225	86,400
Chrome	31,200 lbs.	0.850	26,520	0.800	24,960
Stainless	396,000 lbs.	0.9325	369,270	1.010	399,960
Gray Iron Castings	-	-	420,000	-	420,000
Steel Plate	10,800 pcs.	10.511	113,520	12.222	132,000
Insulation					
Thermafiber	400,000 bd. ft.	0.0512	20,480	0.0584	23,360
Ceraform	48,500 bd. ft.	2.610	126,464	2.1790	105,682
Enamel	-	-	156,000	-	156,000
Wire Oven Racks	26,620 pcs.	5.450	155,980	2.935	84,000
Bright Nickel Plating	32,258 pcs.	1.004	32,400	1.24	40,000
Crates	11,355 pcs.	5.055	57,400	14.443	164,000
Total			$2,563,434		$2,651,562

Table 26

ESTIMATED ANNUAL LABOR COSTS
FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

		Great Lakes Cost		Albany Cost	
Job Description	Number	Hourly Wage	Total	Hourly Wage	Total
Shear Operator	3	$10.19	$ 58,694.4	$5.50	$ 31,680
Shear Helper	2	10.19	39,129.6	5.50	21,120
Punch Press Operator - N/C	2	9.00	34,560.0	5.50	21,120
Punch Press Operator	8	6.35	97,536.0	5.50	84,480
Press Brake Operator	10	6.45	123,840.0	5.50	105,600
Drill Press Operator	5	6.87	65,952.0	5.50	52,800
Misc. Machine Operator	2	6.80	26,112.0	5.50	21,120
Grinder/Polisher	4	8.53	65,510.4	5.50	41,240
Gun Welder	3	6.74	38,822.4	5.50	31,680
Spot Welder	4	9.47	72,729.6	5.50	41,240
Gas/Arc/Mig Welder	5	10.86	104,256.0	5.50	52,800
Repairman	1	4.52	8,678.4	4.50	8,640
Painter	4	9.23	70,886.4	5.50	41,240
Assembler	35	7.14	479,808.0	5.50	369,600
Packer/Crater	2	10.16	39,014.4	5.00	19,200
Material Handler	12	4.38	100,915.2	4.00	90,160
Crib Attendant	1	4.19	8,044.8	4.00	7,680
Parts Packer	2	4.19	16,089.6	4.00	15,360
Shipper	3	4.19	24,134.4	4.00	23,040
Receiving/Warehouse	4	4.19	32,179.2	4.00	30,720
Panel Truck Driver	1	4.19	8,044.8	4.00	7,680
Electrician	2	5.22	20,044.8	6.00	23,040
Millwright	4	5.08	39,014.4	6.00	46,080
Machinist	4	5.22	40,089.6	6.00	46,080
Model Maker	5	5.22	50,112.0	6.00	57,600
Lab Technician	2	5.01	19,238.4	4.50	17,280
Machine Oiler	2	4.24	16,281.6	4.00	15,360
Janitor	2	4.10	15,744.0	4.00	15,360
Subtotal	134		$1,715,462.4		$1,339,000
Fringe Benefits		40%	686,185.0	28%	374,920
Total			$2,401,647.4		$1,713,920

Note: Annual Wage Calculation

Number X Hourly Wage x 8 Hours x 240 Days = Annual Wage

location and at $2,401,647 for the Great Lakes location. Obviously, the Albany area has a distinctive advantage in labor costs.

3. *Utilities.* Natural gas and electricity are necessary for both production and heating purposes. The required annual volume and estimated costs are listed in Table 27. The natural gas requirement for heating purposes is substantially lower in the Albany area than in the Great Lakes area. The heating degree days, a unit that represents one degree below 65 degrees in the mean daily outdoor temperature, is used to indicate the relative coldness of a given location. Albany, Georgia, has an average of 1,872 degree days while the Great Lakes location has an average of 6,500 degree days, which is nearly 3½ times colder than Albany. Total utility costs, excluding lights, water, and sewage, are estimated at $66,071 for Albany and $72,789 for the Great Lakes location.

Table 27

ESTIMATED ANNUAL UTILITY COSTS
FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

Item	Albany		Great Lakes	
	Volume	Costs	Volume	Costs
Natural Gas				
For Production	24,000 CCF	$ 4,701	24,000 CCF	$ 3,960
For Heating	62,640 CCF	11,768	216,000 CCF	35,640
Electricity				
For Production	1,009,013 KWH	49,602	1,009,013 KWH	33,189
Total		$66,071		$72,789

4. *Miscellaneous.* Miscellaneous supplies associated with production, such as wire, nails, steel strapping, wrapping paper, labels, and lubricants, are estimated at about 5% of total materials costs or $131,000 for the Albany location and $136,000 for the Great Lakes location.

Fixed Costs. Fixed costs for the model production are salaries, insurance, ad valorem taxes, miscellaneous, interest and debt service, and depreciation. These fixed costs are described as follows:

1. *Salaries.* Approximately 25 persons are included as the administrative personnel necessary for the model production. Their positions, number, salaries, total costs, and fringe benefits are given in Table 28. Total costs of

administrative salaries plus fringe benefits are estimated at $386,304 for Albany and at $472,780 for Great Lakes.

Table 28

ADMINISTRATIVE PERSONNEL REQUIREMENTS AND ESTIMATED ANNUAL SALARIES FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

Position	Number	Annual Salary			
		Albany		Great Lakes	
Plant Manager	1		$ 25,000		27,000
Superintendent	1		20,000		22,000
Production Foreman	6	@ $13,000	78,000	@ $15,000	90,000
Maintenance Foreman	1		13,000		15,000
Shipping/Receiving Foreman	1		12,000		14,000
Production Control Supervisor	1		16,000		18,000
Buyer	2	@ 8,500	17,000	@ 9,500	19,000
Assembly Scheduler	1		8,400		9,600
Expediter	2	@ 9,000	18,000	@ 10,000	20,000
Senior Manufacturing Engineer	1		16,000		18,000
Tool Engineer	1		14,000		16,000
Time Study Analyst	1		10,000		11,000
Manufacturing Engineering Technician	1		11,000		12,000
Accounting Supervisor	1		15,000		17,000
Payroll/Accounting Clerk	1		8,000		8,700
Key Punch Operator	1		6,800		6,800
Clerk/Typist	2	@ 6,800	13,600	@ 6,800	13,600
Subtotal	25		$301,800		$337,700
Fringe Benefits at		28%	84,504	40%	135,080
Total			$386,304		$472,780

2. *Insurance.* Insurance rates on an industrial plant depend on water availability at the plant, fire prevention equipment installed, building materials, and products and raw materials stored at the plant. Although plant

conditions were assumed the same for both locations, rates obtained are different -- 13 cents per $100 for Great Lakes and 32 cents per $100 for Albany. The total costs are estimated at $11,811 for Albany and at $5,464 for Great Lakes. Detailed calculations are provided in Table 29.

Table 29

ESTIMATED ANNUAL INSURANCE COSTS
FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

Item	Albany	Great Lakes
Inventories		
Materials (6 weeks)	$ 295,000	$ 306,000
Finished Products (2 weeks)	440,000	440,000
Total Inventories	$ 735,000	$ 746,000
Fixed Investments Less Land	2,956,000	3,457,000
Total Insured Amount	$3,691,000	$4,203,000
Insurance Rate	$0.25 x 1.296 = 32¢/100	$0.1 x 1.334 = 13¢/100
Total Costs	$ 11,811	$ 5,464

3. *Ad Valorem Taxes*. Ad valorem taxes differ substantially between Albany and Great Lakes. Based on the fixed investments and inventories given for the two locations, total ad valorem taxes are estimated at $49,789 for the Albany location and at $189,300 for the Great Lakes location. Detailed calculations are given in Table 30.

Table 30

ANNUAL AD VALOREM TAXES
FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

Item	Albany	Great Lakes
Fixed Investments	$3,121,473	$3,787,050
Inventories	735,000	746,000
Total	$3,856,473	$4,533,050
Rate of Valuation	40%	One third
Taxable Amount	$1,542,589	$1,511,017
Tax Rate	$32.276/$1000	$12.528/$100
Total Taxes	$ 49,789	$ 189,300

4. *Miscellaneous Expenses.* Miscellaneous expenses on fixed costs include office supplies, telephone and telegraph, dues and subscriptions, lights, water and sewage, and others. These expenses are estimated at $100,000 for both the locations and are detailed in Table 31.

Table 31

MISCELLANEOUS EXPENSES
FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

Item		Great Lakes
Office Supplies	$ 40,000	$ 40,000
Telephone and Telegraph	20,000	20,000
Dues and Subscriptions	10,000	10,000
Lights	2,492	1,674
Water and Sewage	6,670	5,555
Others	20,838	22,771
Total	$100,000	$100,000

5. *Interest and Debt Retirement.* The capital required would be supplied from two sources -- equity capital and long-term borrowing. It is assumed that one third of the expenditures would be financed by equity capital and two thirds would come from borrowing. Interest and debt retirement have been worked out on a 10-year basis at 9 3/4% per annum on borrowed capital. The interest and debt retirement costs were estimated at $639,298 for Albany and $710,244 for the Great Lakes location. The calculations are given in Table 32.

Table 32

ESTIMATED ANNUAL INTEREST COSTS
FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

Item	Albany	Great Lakes
Total Capital Required	$6,073,473	$6,787,050
Equity Capital	2,000,473	2,262,050
Long-Term Borrowed Capital	4,073,000	4,525,000
Debt Retirement*	639,298	710,244

* Based on a 10-year plan at 9.75% per annum.

6. *Depreciation.* Depreciation is a noncash cost. It is important for entrepreneurs to set aside a sufficient fund for the cost of depreciation. For this study, a 10-year straight-line depreciation method is adopted for machinery and equipment. A 20-year straight-line depreciation is selected for the building and access road. The total costs of depreciation are estimated at $214,486 for Albany and at $245,040 for Great Lakes. The calculations are shown in Table 33.

Table 33

ESTIMATED ANNUAL DEPRECIATION
FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

Item	Annual Rate	Albany		Great Lakes	
		Investment	Depreciation	Investment	Depreciation
Machinery	10%	$1,333,251	$133,325	$1,443,751	$144,375
Building	5%	1,623,222	81,161	2,013,299	100,665
Total			$214,486		$245,040

A summary of annual production costs is provided in Table 34. Variable costs consist of raw materials, labor, utilities, and miscellaneous. Fixed costs include salaries, insurance, ad valorem taxes, and miscellaneous. The manufacturing costs are the sum of variable costs and fixed costs. Adding interest and debt service to the manufacturing costs is equal to out-of-pocket costs. Total production costs are equal to the sum of out-of-pocket costs and depreciation.

Total production costs are estimated at $5,876,113 for the Albany location and at $6,984,826 for the Great Lakes location. The production costs at Albany are over $1 million lower than the Great Lakes location, or about 19% of the total production costs.

Projected Returns

The model production would turn out 18,674 units of electric ranges, bake ovens, pizza ovens, and steam kettles in a normal year. Units on each item, average f.o.b. sale price per unit, and annual returns for the model production are given in Table 35. Total gross sales would reach $9,168,818 a year. Average f.o.b. unit sale price represents actual f.o.b. price excluding

Table 34

ESTIMATED ANNUAL PRODUCTION COSTS
FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

Variable Costs	Albany	Great Lakes
Raw Materials	$2,563,434	$2,651,562
Labor	1,713,920	2,401,647
Utilities	66,071	72,789
Miscellaneous	131,000	136,000
Subtotal	$4,474,425	$5,261,998
Fixed Costs		
Salaries	$ 386,304	$ 472,780
Insurance	11,811	5,464
Ad Valorem Taxes	49,789	189,300
Miscellaneous	100,000	100,000
Subtotal	$ 547,904	$ 767,544
Manufacturing Costs	$5,022,329	$6,029,542
Interest and Debt Service	639,298	710,244
Out-of-Pocket Costs	$5,661,627	$6,739,786
Depreciation	214,486	245,040
Total Production Costs	$5,876,113	$6,984,826

Table 35

ESTIMATED ANNUAL RETURNS
FOR A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT

Item	Units per Year	Average f.o.b. Sale Price per Unit	Annual Returns	Percent of Return
Electric Ranges	10,028	$461	$4,622,972	50
Bake Ovens	2,305	778	1,793,290	20
Pizza Ovens	5,188	463	2,402,044	26
Steam Kettles	1,153	304	350,512	4
Total	18,674		$9,168,818	100

distributor's discount. Electric ranges account for 50% of total sales, bake ovens 20%, pizza ovens 26%, and steam kettles 4%.

A statement of estimated costs and profits on the model production, based on the Albany and Great Lakes locations, is summarized in Table 36. From the gross sales, 5% each has been deducted for cash discounts and for advertising and promotional expenses. These two outlays are considered as sales expenses. Manufacturing costs, consisting of variable costs and fixed costs, are deducted from net sales to obtain operating profits. To determine net profit before taxes, interest and debt retirement and depreciation must be deducted from operating profits. Net profit after taxes is determined by deducting 48% of the profit for federal taxes and 6% for state taxes.

Table 36

SUMMARY STATEMENT OF ESTIMATED COSTS AND PROFITS
OF A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT
FOR ALBANY, GEORGIA, AND A GREAT LAKES LOCATION, 1978

	Albany	Great Lakes
Gross Sales	$9,168,818	$9,168,818
Cash Discounts, 5%	458,441	458,441
Advertisement and Promotion, 5%	458,441	458,441
Net Sales	8,251,936	8,251,936
Manufacturing Costs		
Variable Costs	$4,474,425	$5,261,998
Fixed Costs	547,904	767,544
Operating Profits	$3,229,607	$2,222,394
Interest and Debt Retirement	639,298	710,244
Depreciation	214,486	245,040
Net Profit before Taxes	$2,375,823	$1,267,110
Federal Taxes, 48%	1,140,395	608,213
State Taxes, 6%	142,549	76,027
Net Profit after Taxes	$1,092,879	$ 582,870
Net Profit before Taxes as a Percent of Net Sales	28.8	15.4
Percent Return on		
Fixed Investment	35.0	15.0
Total Investment	18.0	8.6
Net Sales	13.0	7.1
Payout Period	3 years	6.5 years

The model production yields an after-taxes net profit at $1,093,371 for the Albany location and at $582,870 for the Great Lakes location in a normal year. For the Albany location, the return on fixed investment is 35%, on total investment 18%, and on net sales 13%. For the Great Lakes location, the return on fixed investment is 15%, on total investment 8.6%, and on net sales 7.1%. Net profit before taxes as a percentage of net sales is 28.8% for the Albany location and 15.4% for the Great Lakes location. The payout period would be three years for the Albany location and six and one-half years for the Great Lakes location.

Based on the data on net sales, total production costs, out-of-pocket costs, manufacturing costs, and variable costs (see Tables 34 and 35), Figures 7 and 8 show break-even points for these costs in a normal production year. Based on Figure 7, the Albany location requires 14% utilization of production capacity to cover manufacturing costs, 31% utilization to cover out-of-pocket costs, and 38% utilization to cover total production costs. As shown in Figure 8, the Great Lakes location requires 21% utilization of production capacity to cover manufacturing costs, 50% utilization to cover out-of-pocket costs, and 59% utilization to cover total production costs.

The model production shows that production would be profitable in both the Albany location and a Great Lakes location. However, it is evident from the model production that the Albany location would produce the higher profit.

Figure 7

BREAK-EVEN CHART BASED ON ANNUAL NET SALES OF $8,251,936
IN A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT:
ALBANY, GEORGIA

38% utilization of production capacity to cover total production costs
31% utilization of production capacity to cover out-of-pocket costs
14% utilization of production capacity to cover manufacturing costs

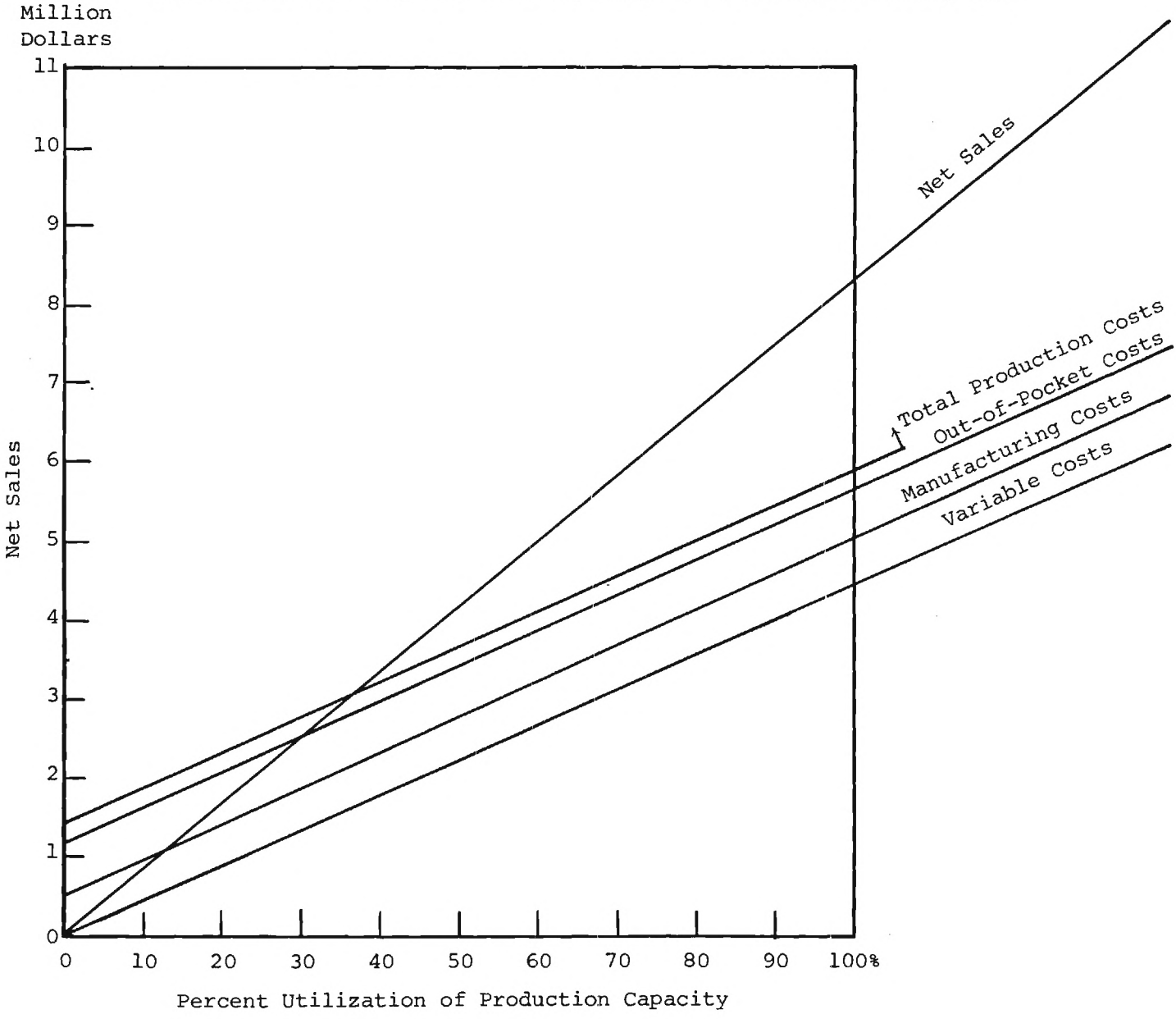
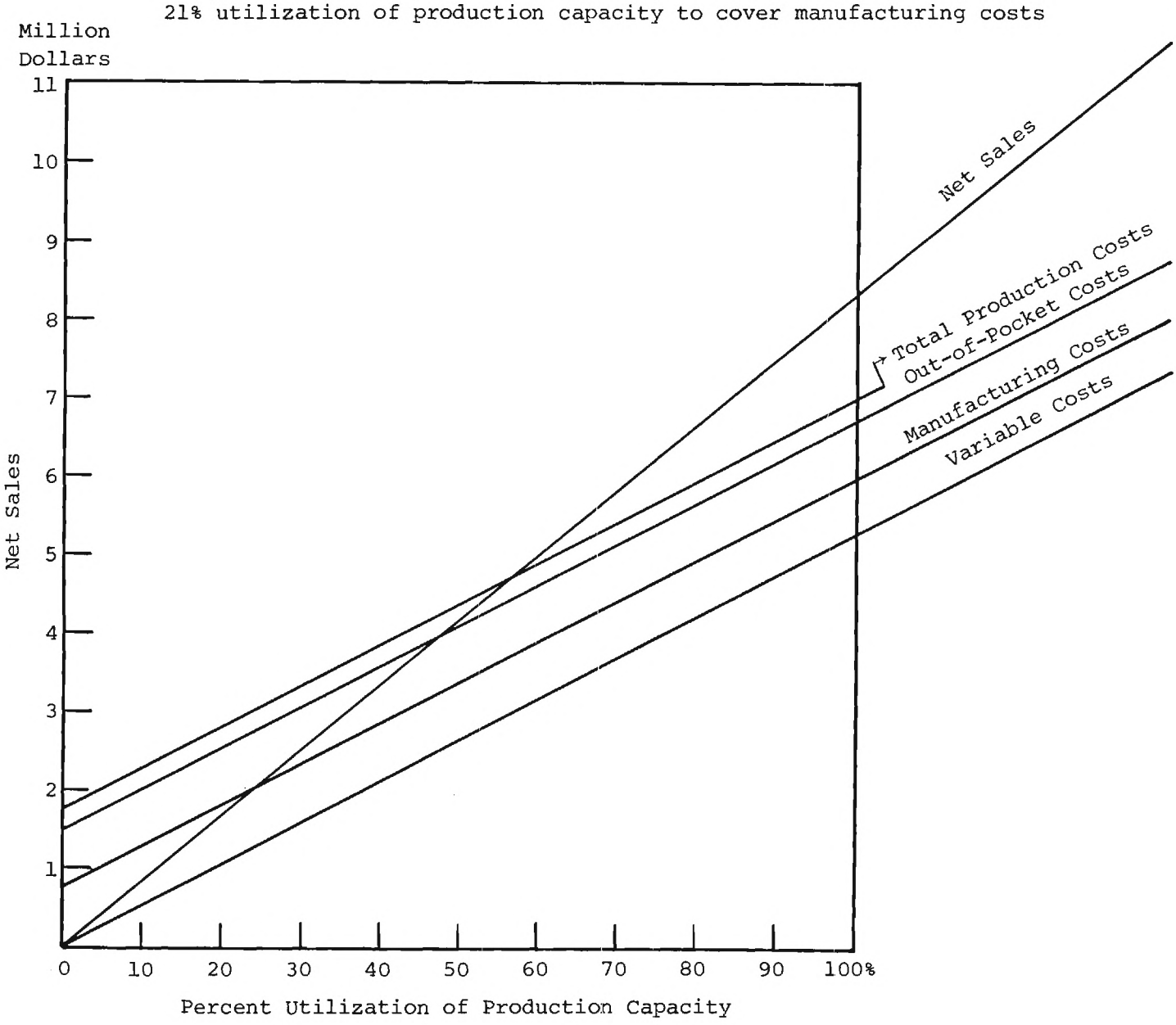


Figure 8

BREAK-EVEN CHART BASED ON ANNUAL NET SALES OF $8,251,936
IN A MODEL PRODUCTION OF FOOD SERVICE EQUIPMENT:
A GREAT LAKES LOCATION

59% utilization of production capacity to cover total production costs
50% utilization of production capacity to cover out-of-pocket costs
21% utilization of production capacity to cover manufacturing costs



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APPENDICES

Appendix 1

EATING AND DRINKING PLACES: RETAIL SALES, 1964-1976
(in thousands of dollars)

	United States	Alabama	Florida	Georgia	Missis-sippi	North Carolina	South Carolina	Tennessee	Seven States
1964									
Sales	$19,746,880	$158,320	$ 644,053	$242,730	$ 77,603	$245,140	$101,760	$211,700	$1,681,306
% of U. S.		0.80	3.26	1.23	0.39	1.24	0.52	1.07	8.51
1965									
Sales	21,753,115	174,087	726,457	271,860	87,629	276,062	112,934	238,836	1,887,865
% of U. S.		0.80	3.34	1.25	0.40	1.27	0.52	1.10	8.68
1966									
Sales	23,768,488	189,192	806,591	303,238	95,591	296,909	124,697	265,425	2,081,643
% of U. S.		0.80	3.39	1.28	0.40	1.25	0.52	1.12	8.76
1967									
Sales	25,208,807	196,359	876,895	322,819	101,272	316,388	131,981	281,746	2,227,460
% of U. S.		0.78	3.48	1.28	0.40	1.26	0.52	1.12	8.84
1968									
Sales	27,154,901	209,543	946,049	348,345	108,126	338,590	140,199	302,425	2,393,277
% of U. S.		0.77	3.48	1.28	0.40	1.25	0.52	1.11	8.81
1969									
Sales	26,271,162	212,305	976,425	405,899	111,539	380,303	165,534	304,590	2,556,595
% of U. S.		0.81	3.72	1.55	0.42	1.45	0.63	1.16	9.73
1970									
Sales	28,366,791	233,070	1,085,924	442,355	122,673	411,619	180,186	332,421	2,808,248
% of U. S.		0.82	3.83	1.56	0.43	1.45	0.64	1.17	9.90
1971									
Sales	29,620,447	253,969	1,094,377	435,234	134,640	409,825	175,763	346,197	2,850,005
% of U. S.		0.86	3.69	1.47	0.45	1.38	0.59	1.17	9.62
1972									
Sales	33,607,995	334,160	1,309,916	490,800	166,892	457,759	209,585	394,624	3,363,736
% of U. S.		0.99	3.90	1.46	0.50	1.36	0.62	1.17	10.01
1973									
Sales	45,199,142	431,620	2,145,913	850,729	220,759	745,565	373,735	639,650	5,407,971
% of U. S.		0.95	4.75	1.88	0.49	1.65	0.83	1.42	11.96
1974									
Sales	47,010,826	513,325	2,286,472	988,297	278,865	792,401	400,714	757,563	6,017,637
% of U. S.		1.09	4.86	2.10	0.59	1.69	0.85	1.61	12.80
1975									
Sales	51,759,305	574,760	2,481,277	1,090,199	300,777	903,011	442,096	806,909	6,599,023
% of U. S.		1.11	4.79	2.11	0.58	1.74	0.85	1.56	12.75
1976									
Sales	56,851,879	640,411	2,820,808	1,203,152	336,069	999,908	497,005	863,050	7,360,403
% of U. S.		1.13	4.96	2.12	0.59	1.76	0.87	1.52	12.95

Source: Sales and Marketing Management, Survey of Buying Power, 1965-1977, New York.

Appendix 2

POPULATION GROWTH IN THE SEVEN-STATE AREA, 1950-1976
(in thousands)

State	1950	1960	1970	1976*
Alabama	3,062	3,267	3,444	3,665
Florida	2,771	4,952	6,789	8,421
Georgia	3,445	3,943	4,590	4,970
Mississippi	2,179	2,179	2,217	2,354
North Carolina	4,062	4,556	5,082	5,469
South Carolina	2,117	2,383	2,591	2,848
Tennessee	3,292	3,567	3,924	4,214
Seven-State Total	20,928	24,846	28,637	31,941
United States	151,326	179,323	203,212	214,659
Seven-State % of U. S.	13.8	13.9	14.1	14.9

* Estimated.

Source: U. S. Department of Commerce, Bureau of the Census, Current Population Reports, Series P-25, No. 373 and Series P-25, No. 642.

Appendix 3

NONAGRICULTURAL EMPLOYMENT, 1950-1972
(in thousands)

State	1950	1960	1970	1972
Alabama	619.6	776.4	010.4	1,065.2
Florida	704.4	1,320.6	2,069.9	2,407.6
Georgia	806.6	1,051.1	1,531.7	1,670.6
Mississippi	311.6	404.0	567.8	629.7
North Carolina	927.8	1,195.5	1,747.0	1,847.3
South Carolina	461.4	582.5	819.8	918.9
Tennessee	759.3	925.5	1,309.8	1,450.4
Seven-State Total	4,590.7	6,255.6	9,056.4	9,989.6
United States	45,222	54,234	70,593	72,764
Seven-State % of U. S.	10.2	11.5	12.8	18.7

Source: U. S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, States and Areas, 1939-72.

Appendix 4

MANUFACTURING EMPLOYMENT, 1950-1972
(in thousands)

State	1950	1960	1970	1972
Alabama	216.1	237.0	323.8	327.8
Florida	102.3	206.7	321.6	334.7
Georgia	286.5	340.8	465.6	473.2
Mississippi	86.4	119.9	181.7	204.8
North Carolina	418.3	509.3	718.6	735.5
South Carolina	210.4	244.8	340.0	353.6
Tennessee	249.9	315.6	464.6	488.3
Total	1,569.9	1,974.1	2,815.9	2,917.9
United States	15,241	16,796	19,349	19,090
Seven-State % of U. S.	10.2	18.1	14.6	15.3

Source: U. S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings Statistics for States and Area, 1939-72.

Appendix 5

CONSTRUCTION EMPLOYMENT, 1950-1972
(in thousands)

State	1950	1960	1970	1972
Alabama	28.2	43.2	49.2	57.4
Florida	66.8	121.8	171.8	203.9
Georgia	40.3	55.3	77.8	93.8
Mississippi	16.9	22.5	32.5	35.2
North Carolina	48.0	65.2	96.5	99.1
South Carolina	24.3	34.6	51.5	61.0
Tennessee	46.2	46.8	63.1	76.2
Total	270.9	389.4	542.4	626.6
United States	2,333	2,885	2,951	3,166
Seven-State % of U. S.	11.6	13.5	18.4	19.8

Source: U. S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings Statistics for States and Areas, 1939-1972.

Appendix 6

TOTAL PERSONAL INCOME, 1950-1976
(in millions of dollars)

State	1950	1960	1970	1976
Alabama	2,691	4,876	9,715	17,704
Florida	3,599	9,746	24,300	48,717
Georgia	3,574	6,489	15,186	26,184
Mississippi	1,613	2,552	5,803	10,254
North Carolina	4,219	7,142	16,246	28,141
South Carolina	1,886	3,298	7,576	13,738
Tennessee	3,295	5,521	12,049	21,413
Total	20,877	39,625	90,825	196,151
United States	227,228	398,725	797,081	1,322,748
Seven-State % of U. S.	9.2	9.9	11.4	14.8

Source: U. S. Department of Commerce, Survey of Current Business.

Appendix 7

PER CAPITA PERSONAL INCOME, 1950-1976

State	1950	1960	1970	1976
Alabama	$ 880	$1,488	$2,876	$5,106
Florida	1,281	1,950	3,664	6,020
Georgia	1,034	1,639	3,354	5,548
Mississippi	755	1,205	2,597	4,529
North Carolina	1,037	1,561	3,218	5,453
South Carolina	893	1,377	2,933	5,147
Tennessee	994	1,543	3,075	5,364
Seven-State Average	$ 982	$1,537	$3,102	$5,310
U. S. Average	$1,496	$2,215	$3,933	$6,399
Seven State % of U. S.	65.6	69.4	78.9	83.0

Source: U. S. Department of Commerce, Survey of Current Business.

Appendix 8

TOTAL LONG-TERM SAVINGS OF INDIVIDUALS, 1950-1975
(in millions of dollars)

State	1950	1960	1970	1975
Alabama	$ 1,010	$ 2,461	$ 6,080	$ 11,686
Florida	1,547	6,709	19,947	44,191
Georgia	1,494	3,695	9,420	17,250
Mississippi	445	1,174	3,090	5,997
North Carolina	1,681	3,819	9,756	18,065
South Carolina	736	1,732	4,019	7,594
Tennessee	1,410	3,335	8,400	15,949
Total	$ 8,323	$ 22,925	$ 60,712	$ 120,732
United States	$123,071	$268,197	$616,216	$1,089,392
Seven-State % of U. S.	6.8	8.5	9.9	11.1

Source: Federal Reserve Bank of Atlanta, Research Department, and Federal Reserve Bank of Richmond, Research Department.

Appendix 9

WHOLESALE TRADE SALES, 1954-1972
(in millions of dollars)

State	1954	1958	1963	1967	1972
Alabama	$ 2,327	$ 2,853	$ 3,395	$ 4,437	$ 7,385
Florida	3,402	5,512	7,487	10,303	19,720
Georgia	4,548	5,741	8,100	11,459	19,465
Mississippi	1,184	1,389	1,787	2,309	3,707
North Carolina	4,184	5,026	6,983	9,530	15,589
South Carolina	1,341	1,605	1,993	2,745	4,568
Tennessee	4,564	5,153	6,677	8,678	14,578
Total	$ 25,131	$ 27,279	$ 36,422	$ 49,461	$ 85,012
United States	$235,651	$285,727	$358,386	$459,475	$683,659
Seven-State % of U. S.	9.1	9.5	10.2	10.8	12.4

Source: U. S. Department of Commerce, Bureau of the Census, Census of Business, 1954-1972.

Appendix 10

RETAIL SALES, 1950-1976
(in millions of dollars)

State	1950	1960	1970	1976
Alabama	$ 1,743	$ 2,922	$ 4,792	$ 10,167
Florida	2,810	6,783	13,315	31,029
Georgia	2,311	3,924	7,439	15,155
Mississippi	1,074	1,657	2,924	6,092
North Carolina	2,624	4,360	7,833	15,088
South Carolina	1,258	1,908	3,665	7,509
Tennessee	2,214	3,484	6,217	12,748
Total	$ 14,034	$ 25,038	$ 46,185	$ 91,696
United States	$140,691	$214,837	$360,954	$661,749
Seven-State % of U. S.	10.0	11.4	17.8	13.9

Source: Sales and Marketing Management, Survey of Buying Power, 1951-1976, New York.

Appendix 11

VALUE ADDED BY MANUFACTURE, 1950-1976
(in millions of dollars)

State	1950	1960	1970	1976
Alabama	$ 1,040	$ 1,958	$ 4,339	$ 6,623.4
Florida	449	1,797	4,560	7,461.2
Georgia	1,236	2,497	5,483	9,785.3
Mississippi	281	702	2,102	3,685.5
North Carolina	1,863	3,805	9,053	13,642.6
South Carolina	858	1,719	3,767	5,941.9
Tennessee	1,174	2,586	6,297	9,297.7
Total	$ 6,901	$ 15,064	$ 35,601	$ 56,437.6
United States	$89,750	$163,999	$299,409	$438,401.8
Seven-State % of U. S.	7.7	9.2	11.9	12.9

Source: U. S. Bureau of the Census, Annual Survey of Manufactures, 1950-1976.

Appendix 12

EXPENDITURES FOR NEW MANUFACTURING PLANTS AND EQUIPMENT, 1951-1975
(in millions of dollars)

State	1951	1960	1970	1975
Alabama	$ 97	$ 202	$ 417	$ 1,062.0
Florida	76	153	378	834.9
Georgia	115	173	453	752.3
Mississippi	42	40	274	260.1
North Carolina	166	240	714	1,225.8
South Carolina	131	144	371	805.7
Tennessee	114	217	508	836.5
Total	$ 741	$ 1,169	$ 3,115	$ 5,777.3
United States	$7,782	$10,070	$22,090	$37,409.9
Seven-State % of U. S.	9.5	11.6	14.1	15.4

Source: U. S. Department of Commerce, Bureau of the Census, Annual Survey of Manufactures, 1951-1975.

Appendix 13

INSTALLED CAPACITY OF ELECTRIC UTILITIES, 1950-1975
(in thousands of kilowatts)

State	1950	1960	1970	1975
Alabama	1,690	4,700	10,172	15,600
Florida	999	3,992	13,868	22,131
Georgia	1,156	2,236	6,739	12,446
Mississippi	200	1,008	2,524	4,152
North Carolina	1,760	4,397	9,979	15,255
South Carolina	847	2,249	4,558	11,163
Tennessee	1,670	7,521	9,753	14,578
Total	8,322	26,103	57,593	95,295
United States	68,919	174,352	360,327	524,268
Seven-State % of U. S.	12.1	15.0	16.0	18.2

Source: U. S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1976.

Appendix 14

REGISTRATION OF NEW AUTOMOBILES, 1959-1975

State	1950	1966	1969	1975
Alabama	82,114	129,693	128,491	128,860
Florida	217,014	181,269	375,087	362,818
Georgia	105,747	329,216	211,681	177,417
Mississippi	38,944	70,362	71,417	71,889
North Carolina	111,941	196,040	218,109	173,778
South Carolina	52,570	96,381	99,248	91,807
Tennessee	87,650	155,617	160,059	157,343
Total	695,198	1,158,578	1,264,092	1,163,912
United States	6,026,500	9,008,488	9,446,524	8,261,840
Seven-State % of U. S.	11.5	12.9	13.4	14.1

Source: Ward's Automotive Yearbook, 1960-1975.

Appendix 15

FOOD SERVICE EQUIPMENT INDUSTRY
TYPE OF LABOR REQUIREMENTS FOR MAJOR END PRODUCTS

Company	Major End Products	Labor Requirements - Nonskilled and Skilled
1	Industrial Infrared Ovens, Food Service Equipment	N/S - Welders, Sheet Metal Men, Electricians S - Engineers, Management
2	Transporting, Holding, and Serving Equipment	N/S - General Laborers S - Welders, Sheet Metal Mechanics
3	Commercial Gas Cooking Equipment, Commercial Electric Cooking Equipment	N/S - Common Laborers S - Press Operators, Welders, Assemblers
4	Food Handling Equipment, Cafeteria Counters	N/S - Material Handlers S - Welders, Forming Machine Operators, Polishers, Electricians
5	Chairs, Stools, Buckets	N/S - Assemblers, Packers, Punch Press Operators S - Sewers
6	Restaurant Candles, Lamps	N/S - Production Workers, Metal Fabricators S - Production Manager
7	Stools, Chairs, Tables, Bases	-
8	Tables, Chairs, Stools	N/S - Sewers, Punch Press Operators, Welders, Laminators S - Tool and Die Men, Manager
9	Commercial Ice Machines	-
10	Refrigerators	N/S - Cleaners, Assemblers, Material Handlers, Clerks S - Welders, Sheet Metalworkers and Machine Operators, Maintenance Men
11	Large Refrigerators, Freezers	N/S - Miscellaneous Factory Workers S - Refrigeration Assemblers, Sheet Metalworkers
12	Ice Machines	N/S - Janitors S - Assemblers, Brazers, Welders, Sheet Metalworkers

(Continued)

Appendix 15 (Continued)

Company	Major End Products	Labor Requirements - Nonskilled and Skilled
13	Large Refrigerators and Freezers	N/S - Assemblers, Machine Operators, Welders, Handlers
14	Large Refrigerators and Freezers, Convection Ovens	N/S - Sheet Metal Machine Operators, Welders, Assemblers S - Refrigerator Test Engineers, Draftsmen
15	Commercial China, Fiberglass and Molded Plastics	-
16	Glassware, Chinaware, Candles, Plastic Ware	N/S - Glass Plant Laborers S - Foremen, Ceramic Decorators, Ceramic Engineers
17	Custom Fabricated Stainless Steel Kitchen Equipment	S - Welders, Finishers, Sheet Metal Mechanics, Cabinet Makers
18	Household Appliances, Bar and Restaurant Equipment	-
19	Cooking Equipment	N/S - Drillers, Painters, Coaters S - Assemblers, Welders, Metalworkers
20	Cleaning Systems for Food Services	N/S - Assemblers of Mechanical and Electrical Parts S - Management
21	Dishwashing Equipment	N/S - Subassemblers, Shippers, Drillers, General Laborers S - Electricians, Welders, Assemblymen, Machinists, Layout Men
22	Beverage Dispensers, Food Dispensers	S - Machinists, Assemblers, Engineers
23	Coffee Brewers, Food Warmers	N/S - Assemblers S - Welders, Metal Fabricators, Wirers, Maintenance Men
24	Coffee Brewing Equipment, Hot Food Servers, Kettles, Skillets	N/S - Assemblers, Shippers, Drivers S - Welders, Sheet Metalworkers, Machinists, Polishers

(Continued)

Appendix 15 (Continued)

Company	Major End Products	Labor Requirements - Nonskilled and Skilled
25	Fabricated Metal Products for Food Service Industry	N/S - Shear Operators, Punch Press Operators, Press Brake Operators, Assemblers S - Electricians, Millwrights, Machinists, Welders
26	Food Service Equipment	N/S - Brake Operators, Welders
27	Commercial Exhaust Hoods, Dining Carts	N/S - Office Employees S - Sheet Metal Workers
28	Food Service Equipment	N/S - Assemblers, Light Machine Workers S - Drill Press Operators, Lathe Operators, Quality Control Engineers
29	Food Service Equipment	N/S - Assemblers S - Welders
30	Food Waste Disposers	N/S - Assemblers S - Machine Operators
31	Restaurant Equipment Hardware	N/S - Machinists, Assemblers
32	Cooking and Warming Equipment	N/S - Press Brake Operators, Shear Operators, Painters, Assemblers, Coaters S - Welders, Polishers, Tool and Die Men
33	Storage and Handling Equipment	N/S - Assemblers, Machinists, Packers S - Welders, Sheet Metal Workers, Machinists
34	Soft Drink Dispensers, Ice Chests, Portable Bars	-
35	Conveyors, Utility Raceways	N/S - Assemblers, Packers S - Machinists, Sheet Metal Mechanics, Welders, Electricians, Brake Operators, Draftsmen, Engineers
36	Ice Cream Machines	N/S - Assemblers, Packers, Shippers S - Testers
37	Commercial Dishwashers	-

(Continued)

Appendix 15 (Continued)

Company	Major End Products	Labor Requirements - Nonskilled and Skilled
38	Beverage Systems	N/S - Assemblers S - Technical Management
39	Injection Molded Plastic Milk Crates, Pallets, Chicken Coops	S - Machine Operators
40	Commercial Vitrified Chinaware	N/S - General Laborers S - Liners, Mechanics, Technicians
41	Deep Fat Fryers	N/S - General Laborers S - Welders, Engineers
42	Vegetable Cutters, Can and Bottle Crushers	N/S - Assemblers S - Machinists, Tool and Die Men
43	Drink Dispensers, Carbonators	N/S - Production Workers, Clerical Workers S - Welders, Electricians, Refrigeration Specialists, Engineers
44	Commercial Compactors	-

Source: A Survey Conducted by Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology in 1977.

Appendix 16

FOOD SERVICE EQUIPMENT INDUSTRY
MATERIALS PURCHASED FOR MAJOR END PRODUCTS

Company	Major End Products	Materials Purchased
1	Industrial Infrared Ovens, Food Service Equipment	-
2	Transporting, Holding, and Serving Equipment	Stainless Steel, Aluminum, Electrical Parts, Hardware Parts
3	Commercial Gas Cooking Equipment, Commercial Electric Cooking Equipment	Steel, Controls
4	Food Handling Equipment, Cafeteria Counters	Stainless Steel Sheets, Cold Rolled Steel
5	Chairs, Stools, Buckets	Vinyl, Foam, Steel, Wood, Cotton
6	Restaurant Candles, Lamps	Wax, Sheet Metal, Glass
7	Stools, Chairs, Tables, Bases	Steel, Vinyl, Nylon, Foam Rubber, Wood
8	Tables, Chairs, Stools	Cold Rolled Steel Tubing, Coil and Sheet Steel, Laminated Particleboard, Grey Iron Castings, Foam, Upholstery
9	Commercial Ice Machines	-
10	Refrigerators	-
11	Large Refrigerators, Freezers	Aluminum, Polystyrene Foam, Urethane Foam, Galvanized Steel
12	Ice Machines	Copper, Steel, Brass, Iron, Aluminum, Plastics, Galvanized Steel, Foam
13	Large Refrigerators and Freezers	Stainless Steel, Refrigeration Components, Plastics, Hardware
14	Large Refrigerators and Freezers, Convection Ovens	Aluminum, Stainless Steel, Cold Rolled and Galvanized Steel, Polyurethane, Aluminum and Plastic Extrusions, Copper Tubing, Controls
15	Commercial China, Fiberglass and Molded Plastics	Alumina, Flint, Felspar, Kaolin

(Continued)

Company	Major End Products	Materials Purchased
16	Glassware, Chinaware, Candles, Plastic Ware	Sand, Clay, Cartons, Plastic Resins
17	Custom Fabricated Stainless Steel Kitchen Equipment	Stainless Steel Sheets and Tubing, Galvanized Steel Sheets
18	Household Appliances, Bar and Restaurant Equipment	Stainless Steel, Glass, Plastic, Copper Wire
19	Cooking Equipment	Sheet Steel, Gas Fittings, Burners
20	Cleaning Systems for Food Services	Motors, Pumps, Fabricated Sheet Metal, Hose, Tubing
21	Dishwashing Equipment	Stainless Steel, Motors, Pumps, Valves, Heaters, Timers
22	Beverage Dispensers, Food Dispensers	Plastic, Sheet Steel, Electrical Parts
23	Coffee Brewers, Food Warmers	Stainless Steel, Electric Components, Glass, Plastic, Packaging
24	Coffee Brewing Equipment, Hot Food Servers, Kettles, Skillets	Stainless Steel Pipes, Tubings, Sheets, Machined Parts
25	Fabricated Metal Products for Food Service Industry	Sheet Steel, Grey Iron Castings
26	Food Service Equipment	Aluminum
27	Commercial Exhaust Hoods, Dining Carts	Stainless Steel, Copper Tubing, Solenoid Valves, Timers, Casters, Raw ABS Plastic
28	Food Service Equipment	Cast Iron Castings, Aluminum Castings, Other Alloy Castings
29	Food Service Equipment	Steel, Motors, Valves
30	Food Waste Disposers	Stainless Steel Sheets, Ductile Iron Castings, Aluminum Castings, Electric Motors
31	Restaurant Equipment Hardware	Screw Machine Parts
32	Cooking and Warming Equipment	Steel, Castings, Valves, Paint, Fasteners, Controls

(Continued)

Appendix 16 (Continued)

Company	Major End Products	Materials Purchased
33	Storage and Handling Equipment	Steel, Casters, Electric Components, Office and Cleaning Supplies
34	Soft Drink Dispensers, Ice Chests, Portable Bars	Stainless Steel, Valves
35	Conveyors, Utility Raceways	-
36	Ice Cream Machines	Electrical, Refrigeration
37	Commercial Dishwashers	-
38	Beverage Systems	Sheet Metal, Solenoids, Plastic Tubing, Switches
39	Injection Molded Plastic Milk Crates, Pallets, Chicken Coops	Plastic Resins
40	Commercial Vitrified Chinaware	Clay, Alumina Oxide
41	Deep Fat Fryers	Controls, Steel, Wire Goods
42	Vegetable Cutters, Can and Bottle Crushers	Electric Motors, Stainless Steel, Aluminum
43	Drink Dispensers, Carbonators	Steel, Refrigerator Domes, Motors, Pumps, Wiring, Tubing
44	Commercial Compactors	-

Source: A Survey Conducted by Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology in 1977.

Appendix 17

FOOD SERVICE EQUIPMENT INDUSTRY
OUTSIDE SUPPORTING SERVICES REQUIRED FOR MAJOR END PRODUCTS

Company	Major End Products	Outside Supporting Services Required
1	Industrial Infrared Ovens, Food Service Equipment	Electrical, Wire Fabricators
2	Transporting, Holding and Serving Equipment	Forging
3	Gas and Electric Commercial Cooking Equipment	Plating
4	Food Handling Equipment, Cafeteria Counters	Stamping, Rubber Molding and Extrusions, Forming
5	Chairs, Stools, Buckets	Plating, Painting, Welding, Tube Fabrication
6	Restaurant Candles, Lamps	Stamping, Forging, Coating, Plating
7	Stools, Chairs, Tables, Bases	Chrome Plating
8	Tables, Chairs, Stools	-
9	Commercial Ice Machines	-
10	Refrigerators	Coating, Galvanizing, Hardware
11	Large Refrigerators, Freezers	Vinyl and Aluminum Plastic Extrusions
12	Ice Machines	Brazing, Nickel Plating, Teflon Coating, Fabricated Plastics
13	Large Refrigerators and Freezers	-
14	Large Refrigerators and Freezers, Convection Ovens	Stampings, Castings, Extrusions
15	Commercial China, Fiberglass and Molded Plastics	Refractories, Natural Gas
16	Glassware, Chinaware, Candles, Plastic Ware	Mold Building
17	Custom Fabricated Stainless Steel Kitchen Equipment	Fiberglass
18	Household Appliances, Bar and Restaurant Equipment	Die Casting, Stamping, Coating, Electronic Subassembly

(Continued)

Appendix 17 (Continued)

Company	Major End Products	Outside Supporting Services Required
19	Cooking Equipment	Enameling
20	Cleaning Systems for Food Services	Plating, Sheet Metal Forming
21	Dishwashing Equipment	Cast Iron Castings, Nonferrous Castings, Teflon Coating, Metal Stamping
22	Beverage Dispensers, Food Dispensers	-
23	Coffee Brewers, Food Warmers	Fabrication, Stamping Injection Molding, Corrugated Containers
24	Coffee Brewing Equipment, Hot Food Servers, Kettles, Skillets	Permanent Moulding, P.T.F.E. Coating, Spinning, Plating, Stamping
25	Fabricated Metal Products for Food Service Industry	Tool and Die Making, Porcelain Enameling
26	Food Service Equipment	Sheet Metal
27	Commercial Exhaust Hoods, Dining Carts	-
28	Food Service Equipment	Stamping, Forging, Coating, Foundries
29	Food Service Equipment	Metal Fabrication
30	Food Waste Disposers	Foundries
31	Restaurant Equipment Hardware	Screw Machine Parts
32	Cooking and Warming Equipment	Castings, Procelainizing
33	Storage and Handling Equipment	Coating
34	Soft Drink Dispensers, Ice Chests, Portable Bars	Stainless Steel Fabricators
35	Conveyors, Utility Raceways	Plastic Molding
36	Ice Cream Machines	Sheet Metal Fabrication, Welding
37	Commercial Dishwashers	-
38	Beverage Systems	Stamping, Molding, Extruding

(Continued)

Appendix 17 (Continued)

Company	Major End Products	Outside Supporting Services Required
39	Injection Molded Plastic Milk Crates, Pallets, Chicken Coops	-
40	Commercial Vitrified Chinaware	-
41	Deep Fat Fryers	-
42	Vegetable Cutters, Can and Bottle Crushers	Stamping, Casting, Welding, Pattern Work
43	Drink Dispensers, Carbonators	-
44	Commercial Compactors	-

Source: A Survey Conducted by Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology in 1977.

Appendix 18

FOOD SERVICE EQUIPMENT INDUSTRY
MODE OF TRANSPORTATION BY TRUCK, RAIL, AND BY WATER
(in percent)

Company	Major End Products	In Shipments			Out Shipments		
		Truck	Rail	Water	Truck	Rail	Water
1	Industrial Infrared Ovens, Food Service Equipment	100	-	-	100	-	-
2	Transporting, Holding, and Serving Equipment	100	-	-	100	-	-
3	Commercial Gas Cooking Equipment, Commercial Electric Cooking Equipment	100	-	-	100	-	-
4	Food Handling Equipment, Cafeteria Counters	-	-	-	-	-	-
5	Chairs, Stools, Buckets	95	5	-	100	-	-
6	Restaurant Candles, Lamps	90	10	-	95	5	-
7	Stools, Chairs, Tables, Bases	95	-	-	95	-	-
8	Tables, Chairs, Stools	100	-	-	100	-	-
9	Commercial Ice Machines	-	-	-	-	-	-
10	Refrigerators	75	15	10	75	15	10
11	Large Refrigerators, Freezers	100	-	-	100	-	-
12	Ice Machines	90	-	-	90	-	-
13	Large Refrigerators and Freezers	100	-	-	100	-	-
14	Large Refrigerators and Freezers, Convection Ovens	90	10	-	95	5	-
15	Commercial China, Fiberglass and Molded Plastics	X	X	-	100	-	-
16	Glassware, Chinaware, Candles, Plastic Ware	50	50	-	75	25	-
17	Custom Fabricated Stainless Steel Kitchen Equipment	-	-	-	-	-	-

X - Unknown percent.

(Continued)

Appendix 18 (Continued)

Company	Major End Products	In Shipments			Out Shipments		
		Truck	Rail	Water	Truck	Rail	Water
18	Household Appliances, Bar and Restaurant Equipment	-	-	-	-	-	-
19	Cooking Equipment	100	-	-	100	-	-
20	Cleaning Systems for Food Services	100	-	-	100	-	-
21	Dishwashing Equipment	97	-	-	100	-	-
22	Beverage Dispensers, Food Dispensers	95	5	-	95	5	-
23	Coffee Brewers, Food Warmers	X	X	-	100	-	-
24	Coffee Brewing Equipment, Hot Food Servers, Kettles, Skillets	70	20	-	70	20	-
25	Fabricated Metal Products for Food Service Industry	100	-	-	100	-	-
26	Food Service Equipment	-	-	-	-	-	-
27	Commercial Exhaust Hoods, Dining Carts	60	40	-	100	-	-
28	Food Service Equipment	100	-	-	100	-	-
29	Food Service Equipment	100	-	-	100	-	-
30	Food Waste Disposers	-	-	-	-	-	-
31	Restaurant Equipment Hardware	100	-	-	100	-	-
32	Cooking and Warming Equipment	100	-	-	100	-	-
33	Storage and Handling Equipment	100	-	-	100	-	-
34	Soft Drink Dispensers, Ice Chests, Portable Bars	90	-	-	98	-	-
35	Conveyors, Utility Raceways	-	-	-	-	-	-
36	Ice Cream Machines	75	-	-	50	-	-
37	Commercial Dishwashers	95	-	-	95	-	-

X - Unknown percent.

(Continued)

Appendix 18 (Continued)

Company	Major End Products	In Shipments			Out Shipments		
		Truck	Rail	Water	Truck	Rail	Water
38	Beverage Systems	100	-	-	100	-	-
39	Injection Molded Plastic Milk Crates, Pallets, Chicken Coops	10	90	-	90	10	-
40	Commercial Vitrified Chinaware	20	80	-	100	-	-
41	Deep Fat Fryers	-	-	-	-	-	-
42	Vegetable Cutters, Can and Bottle Crushers	100	-	-	100	-	-
43	Drink Dispensers, Carbonators	95	-	-	95	-	-
44	Commercial Compactors	-	-	-	-	-	-

Source: A Survey Conducted by Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology in 1977.

Appendix 19

FOOD SERVICE EQUIPMENT INDUSTRY
MODE OF TRANSPORTATION AND AVERAGE DISTANCE IN MILES

Company	Major End Products	In Shipments		Out Shipments	
		Truck	Rail	Truck	Rail
1	Industrial Infrared Ovens, Food Service Equipment	382.3	864.5	750	885.7
2	Transporting, Holding, and Serving Equipment	-	-	-	-
3	Commercial Gas Cooking Equipment, Commercial Electric Cooking Equipment	-	-	-	-
4	Food Handling Equipment, Cafeteria Counters	-	-	-	-
5	Chairs, Stools, Buckets	250	2,000	1,000	-
6	Restaurant Candles, Lamps	1,000	1,000	500	1,000
7	Stools, Chairs, Tables, Bases	-	-	-	-
8	Tables, Chairs, Stools	300	-	300	-
9	Commercial Ice Machines	-	-	-	-
10	Refrigerators	1,000	2,000	1,500	2,000
11	Large Refrigerators, Freezers	1,000	-	1,200	-
12	Ice Machines	400	-	600	-
13	Large Refrigerators and Freezers	-	-	-	-
14	Large Refrigerators and Freezers, Convection Ovens	350	350	500	600
15	Commercial China, Fiberglass and Molded Plastics	1,000	1,000	1,200	-
16	Glassware, Chinaware, Candles, Plastic Ware	200	300	350	500
17	Custom Fabricated Stainless Steel Kitchen Equipment	-	-	-	-
18	Household Appliances, Bar and Restaurant Equipment	-	-	-	-

(Continued)

Appendix 19 (Continued)

Company	Major End Products	In Shipments		Out Shipments	
		Truck	Rail	Truck	Rail
19	Cooking Equipment	400	-	400	-
20	Cleaning Systems for Food Services	200	-	1,000	-
21	Dishwashing Equipment	350	-	500	-
22	Beverage Dispensers, Food Dispensers	1,200	1,200	1,500	1,500
23	Coffee Brewers, Food Warmers	30	800	-	-
24	Coffee Brewing Equipment, Hot Food Servers, Kettles, Skillets	200	300	200	300
25	Fabricated Metal Products for Food Service Industry	150	-	400	-
26	Food Service Equipment	-	-	-	-
27	Commercial Exhaust Hoods, Dining Carts	500	-	1,000	-
28	Food Service Equipment	100	-	1,000	-
29	Food Service Equipment	-	-	-	-
30	Food Waste Disposers	-	-	-	-
31	Restaurant Equipment Hardware	100	-	-	-
32	Cooking and Warming Equipment	-	-	-	-
33	Storage and Handling Equipment	-	-	-	-
34	Soft Drink Dispensers, Ice Chests, Portable Bars	-	-	-	-
35	Conveyors, Utility Raceways	-	-	-	-
36	Ice Cream Machines	150	-	150	-
37	Commercial Dishwashers	150	-	-	-
38	Beverage Systems	50	-	1,500	-
39	Injection Molded Plastic Milk Crates, Pallets, Chicken Coops	60	60	300	300

(Continued)

Appendix 19 (Continued)

Company	Major End Products	In Shipments		Out Shipments	
		Truck	Rail	Truck	Rail
40	Commercial Vitrified Chinaware	35	500	600	-
41	Deep Fat Fryers	-	-	-	-
42	Vegetable Cutters, Can and Bottle Crushers	-	-	-	-
43	Drink Dispensers, Carbonators	-	-	-	-
44	Commercial Compactors	-	-	800	-

Source: A Survey Conducted by Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology in 1977.

Appendix 20-A

STEEL MILL FACILITIES IN THE SEVEN SOUTHEASTERN STATES, 1974

Company	Steel Furnace: Electric No.	Electric 1/	Basic Oxygen No.	Basic Oxygen 1/	Open Hearth No.	Open Hearth 1/	Bessemer No.	Bessemer 1/	Vacuum Arc No.	Vacuum Arc 1/	Intermediate Mills: Bloom No.	Bloom 2/	Billet No.	Billet 2/
Alabama														
Bethlehem Steel														
Connors Steel Co.	2	45												
Formed Tubes, Inc.														
Plymouth Tube Co.														
Republic Steel Corp.	2	185	2	150							1	1,332		
Southern Electric Steel Co.	2	15												
Southern Fabricating Co.														
U. S. Steel Corp.	–	–	–	–	21	380	3	24			3	3,094	2	1,165
Subtotal	6	245	4	350	21	380	3	24			4	4,426	2	1,165
Florida														
ADCOM														
Florida Steel Corp.	6	30												
Mid-States Steel and Wire	–	–												
Subtotal	6	30												
Georgia														
Atlantic Steel Co.	2	85									1	480	1	480
Bekaert Wire Corp.														
Georgia Tubing Corp.														
Tull Allied Metal Products	–	–									–	–	–	–
Subtotal	2	85									1	480	1	480
Mississippi														
Mid-States Steel and Wire														
Mississippi Steel, Magna Corp.	3	35												
Piper Industries														
Southern Precision Steel	–	–												
Subtotal	3	35												
North Carolina														
Florida Steel Co.	2	55							7	9				
Teledyne Allvac														
Walker Manufacturing Co.	–	–							–	–				
Subtotal	2	55							7	9				
South Carolina														
Georgetown Steel Corp.	3	75											1	200
Nucor Corp.	3	32											–	–
Subtotal	6	107											1	200
Tennessee														
Knoxville Iron Co.	3	35												
Piper Industries														
Republic Steel Corp.														
Tennessee Forging Steel Corp.	3	25	–	–	–	–	–	–	–	–	–	–	–	–
Subtotal	6	60												
Total	31	617	4	350	21	380	3	24	7	9	5	4,906	4	1,845

1/ Tons per heat.
2/ Annual rolling capacity in thousands of net tons.

Source: Directory of Iron and Steel Works of the United States and Canada, 1974, American Iron and Steel Institute, New York.

Appendix 20-B

STEEL MILL FACILITIES IN THE SEVEN SOUTHEASTERN STATES, 1974

Company	Finishing Mills																			
	Rod		Bar		Strip		Plate		Sheet		Tin Plate		Structural Shape		Rail		Cotton Tie	
	No.	2/	No.	2/	No.	2/	No.	2/	No.	2/	No.	2/	No.	2/	No.	2/	No.	2/
Alabama																		
Bethlehem Steel																		
Connors Steel Co.																		
Formed Tubes, Inc.																		
Plymouth Tube Co.																		
Republic Steel Corp.					4	2,226	1	510	1	41								
Southern Electric Steel Co.			1	90														
Southern Fabricating Co.																		
U. S. Steel Corp.	1	200	1	177	1	1,600	1	515	5	4,526	3	789	1	261	1	581	1	70
Subtotal	1	200	2	267	5	3,826	2	1,025	6	4,567	3	789	1	261	1	581	1	70
Florida																		
ADCOM																		
Florida Steel Corp.			3	715														
Mid-States Steel and Wire			—	—														
Subtotal			3	715														
Georgia																		
Atlantic Steel Co.	1	250	1	206	2	106												
Bekaert Wire Corp.																		
Georgia Tubing Corp.																		
Tull Allied Metal Products	—	—	—	—	—	—												
Subtotal	1	250	1	206	2	106												
Mississippi																		
Mid-States Steel and Wire																		
Mississippi Steel, Magna Corp.			3	120														
Piper Industries																		
Southern Precision Steel			—	—														
Subtotal			3	120														
North Carolina																		
Florida Steel Co.			2	120														
Teledyne Allvac			4	13														
Walker Manufacturing Co.			—	—														
Subtotal			6	133														
South Carolina																		
Georgetown Steel Corp.			1	200									1					
Nucor Corp.			3	200									—					
Subtotal			4	400									1					
Tennessee																		
Knoxville Iron Co.			4	90														
Piper Industries																		
Republic Steel Corp.																		
Tennessee Forging Steel Corp.	—	—	4	120	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal			8	210														
Total	2	450	27	2,051	7	3,932	2	1,025	6	4,567	3	789	2	261	1	581	1	70

2/ Annual rolling capacity in thousands of net tons.

Source: Directory of Iron and Steel Works of the United States and Canada, 1974, American Iron and Steel Institute, New York.

Appendix 20-C

STEEL MILL FACILITIES IN THE SEVEN SOUTHEASTERN STATES, 1974

State and Company	Fabricating Plants							
	Wire No.	Nail No.	Tube No.	Forging No.	Pipe No.	Galvanized Sheet No.	Bolts and Bolts No.	Pre-engineered Buildings No.
Alabama								
Bethlehem Steel							1	
Connors Steel Co.								
Formed Tubes, Inc.			2					
Plymouth Tube Co.			1					
Republic Steel Corp.	1				1	1	1	
Southern Electric Steel Co.			3					
Southern Fabricating Co.			5					
U. S. Steel Corp.	1		—	1	—	—	—	
Subtotal	2		11	1	1	1	2	
Florida								
ADCOM	1							
Florida Steel Corp.								
Mid-States Steel and Wire	1							
Subtotal	2							
Georgia								
Atlantic Steel Co.	1	1	1			1		1
Bekaert Wire Corp.	1							
Georgia Tubing Corp.			1					
Tull Allied Metal Products	—	—	1			—		—
Subtotal	2	1	3			1		1
Mississippi								
Mid-States Steel and Wire	1							
Mississippi Steel, Magna Corp.								
Piper Industries								
Southern Precision Steel	—							
Subtotal	1							
North Carolina								
Florida Steel Co.								
Teledyne Allvac								
Walker Manufacturing Co.			1		1			
Subtotal			1		1			
South Carolina								
Georgetown Steel Corp.								
Nucor Corp.	1	1						
Subtotal	1	1						
Tennessee								
Knoxville Iron Co.				1				
Piper Industries								
Republic Steel Corp.					1			
Tennessee Forging Steel Corp.	—	—	—	—	—	—	—	—
Subtotal				1	1			
Total	8	2	15	2	3	2	2	1

Source: Directory of Iron and Steel Works of the United States and Canada, 1974, American Iron and Steel Institute, New York.

Project A-2017

THE FEASIBILITY OF MANUFACTURING FOOD PRODUCTS MACHINERY IN SOUTHWEST GEORGIA

Prepared for

The Southwest Georgia
Planning and Development Commission

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by

Tze I. Chiang
Project Director

and

Edwin L. Lewis
Research Engineer

GEORGIA INSTITUTE OF TECHNOLOGY
Engineering Experiment Station
Technology and Development Laboratory
Economic Development Division
Atlanta, Georgia 30332
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materials concerning plant locations, wage rates, financial assistance for new industries, and labor training programs in Georgia.

Last but not the least, the authors are indebted to a sales engineer with a food machinery corporation for his assistance in providing some data for the model production. They are also grateful to the 59 food products machinery manufacturers across the nation who responded enthusiastically to the survey conducted for this study.

Summary

The value of shipments of food products machinery in the United States increased from $588 million in 1961 to $1,542 million in 1976, a 6.6% annual growth rate. The shipments were projected to reach $3,037 million (in current dollars) by 1985, a 7.8% annual growth rate. The growth in the value of shipments of food products machinery has paralleled the increase in the value of shipments of food and kindred products since food products machinery is used largely in the processing and packaging of food materials and related products.

Of the $1,542 million food products machinery shipments in 1976, market outlets were estimated as: meat products 22.5%; dairy products 11.5%; canned, cured, and frozen foods 11%; grain mill products 6.5%; bakery products 7.5%; sugar and confectionery 3.5%; fats and oils 6.7%; beverages 18.3%; and miscellaneous foods such as potato chips, coffee, peanut butter, etc., 12.5%. Outlets in meat products, grain mill products, and beverages are strong growth areas.

In 1976, exports comprised about 32.5% of the total value of food products machinery shipments in the United States and imports constituted about 15% of the domestic market. Major exporting destinations were Canada, Mexico, Venezuela, United Kingdom, and Japan. Major importers were West Germany, Switzerland, Italy, United Kingdom, and Canada.

In a seven-state regional market of the Southeast, consisting of Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee, the value of shipments for food products machinery was estimated at $150 million in 1975 and was projected to be $347 million by 1985, a 8.7% annual growth rate. This seven-state market constituted 12.35% of the value of shipments of food products machinery in the nation in 1975, and it was projected to be 14.3% of the national market by 1985. The larger market increase in the seven-state region reflects the continued growth trends in population and other economic activities in this region as compared to the nation as a whole.

There were about 631 establishments engaged in the manufacture of food products machinery in the nation in 1975. However, only 45 of these establishments were located in the seven-state region, or about 7% of the national total. In contrast, there were 24,651 establishments engaged in food processing in the nation in 1975 and 3,132 of them were located in the seven-state region, or 12.7% of the national total. In light of the projected 1985 sales figures for

both food products machinery and food processing industries in the region and because of the small number of food machinery manufacturers in the region, a need exists for new food products machinery plants to be built in Southwest Georgia.

Southwest Georgia has distinctive advantages as a location for the food products machinery manufacturer. The major advantages are summarized below:

- o Labor productivity and dependability - Labor productivity in the area is one of the highest in the nation as reflected by the value added per dollar of total payroll cost. Average percent of working time lost in a given area reflects labor dependability, and working time lost in the area is among the lowest.
- o Wages - The average wage rates in the area are substantially lower than northern industrial states and relatively lower than some neighboring states.
- o Material supplies and supportive services - Nearly all materials and supportive services needed in the food products machinery industry can be obtained in Georgia or from neighboring states.
- o Taxes - Tax rates are substantially lower in Southwest Georgia than northern industrial states and are relatively lower than other locations in Georgia and neighboring states.
- o Accessibility to markets - Compared with most northern locations, Southwest Georgia has a clear freight advantage over other southern states and over some southwestern states. However, the higher freight rates to northern, midwestern, and Pacific states can be absorbed by substantial savings in production costs in the area.
- o Financial assistance and training programs - Georgia offers a variety of industrial financing and employee training programs for new industries.
- o Gentle climate - The area has a gentle climate throughout the year. This is a definite advantage in view of the hardships encountered in northern locations during winter months.

A case study of a model production, which was designed to produce pasteurizer/coolers and spin coolers, was conducted to determine the differences in investment requirements, production costs, and projected returns of plants located in Albany, Georgia (Southwest Georgia), and Chicago, Illinois. Major findings are given as follows:

Item	Albany	Chicago
Units produced/year	22	22
Land, acres	4	4
Buildings, square feet	14,500	14,500
Number of workers	25	25
Administrative personnel	12	12
Fixed capital investment	$ 943,106	$1,294,718
Working capital	$ 465,636	$ 465,636
Material costs/year	$1,084,826	$1,203,990
Wages and benefits/year	$ 359,040	$ 502,656
Total production costs/year	$1,965,964	$2,393,760
Gross sales/year	$2,501,181	$2,501,181
Net sales/year	$2,251,063	$2,251,063
Net profit before taxes	$ 285,099	($ 142,697)
Net profit after taxes	$ 131,145	0
Net profit before taxes/net sales	12.7%	0
Percent return on fixed investment	13.9%	0
Payout period	7 years	-

INTRODUCTION

Purpose of Study

In recent decades the economic growth of the Sun Belt has provided opportunities for southern communities to attract new industrial plants into their area. However, plant location decisions are complex and must relate the supply, market, and other requirements of the manufacturing process to the resources and attributes of a particular candidate area. For this reason, the Southwest Georgia Planning and Development Commission asked the Economic Development Division of Georgia Tech to undertake an objective evaluation of two desirable industries -- food service equipment and food products machinery -- to determine the feasibility of establishing these two types of manufacturing in Southwest Georgia. This report treats only the food products machinery industry. A separate study deals with the food service equipment industry.

The Southwest Georgia Planning and Development Commission will use this research in its selective development efforts as a tool to attract potential investors to Southwest Georgia. Map 1 shows the 14-county area comprising the Southwest Georgia Planning and Development Commission.

Objectives and Methodology

The main objectives of this research are given as follows:

1. To determine the production requirements of the food products machinery industry in terms of labor, material supplies, fuel and utilities and their availability in the Southwest Georgia area.
2. To study the markets and marketing practices of the industry.
3. To provide a freight analysis based on selected locations.
4. To compare the relative costs of investment and production of a Southwest Georgia location and an out-of-state location.

In order to satisfy the research objectives mentioned above, four tasks were completed. (See Figure 1.) Methods or approaches used in accomplishing these tasks are summarized here.

The first task assessed the manufacturing requirements of the industry. A nationwide survey of food products machinery manufacturers was conducted at the

Map 1

FOURTEEN-COUNTY SOUTHWEST GEORGIA PLANNING
AND DEVELOPMENT COMMISSION AREA

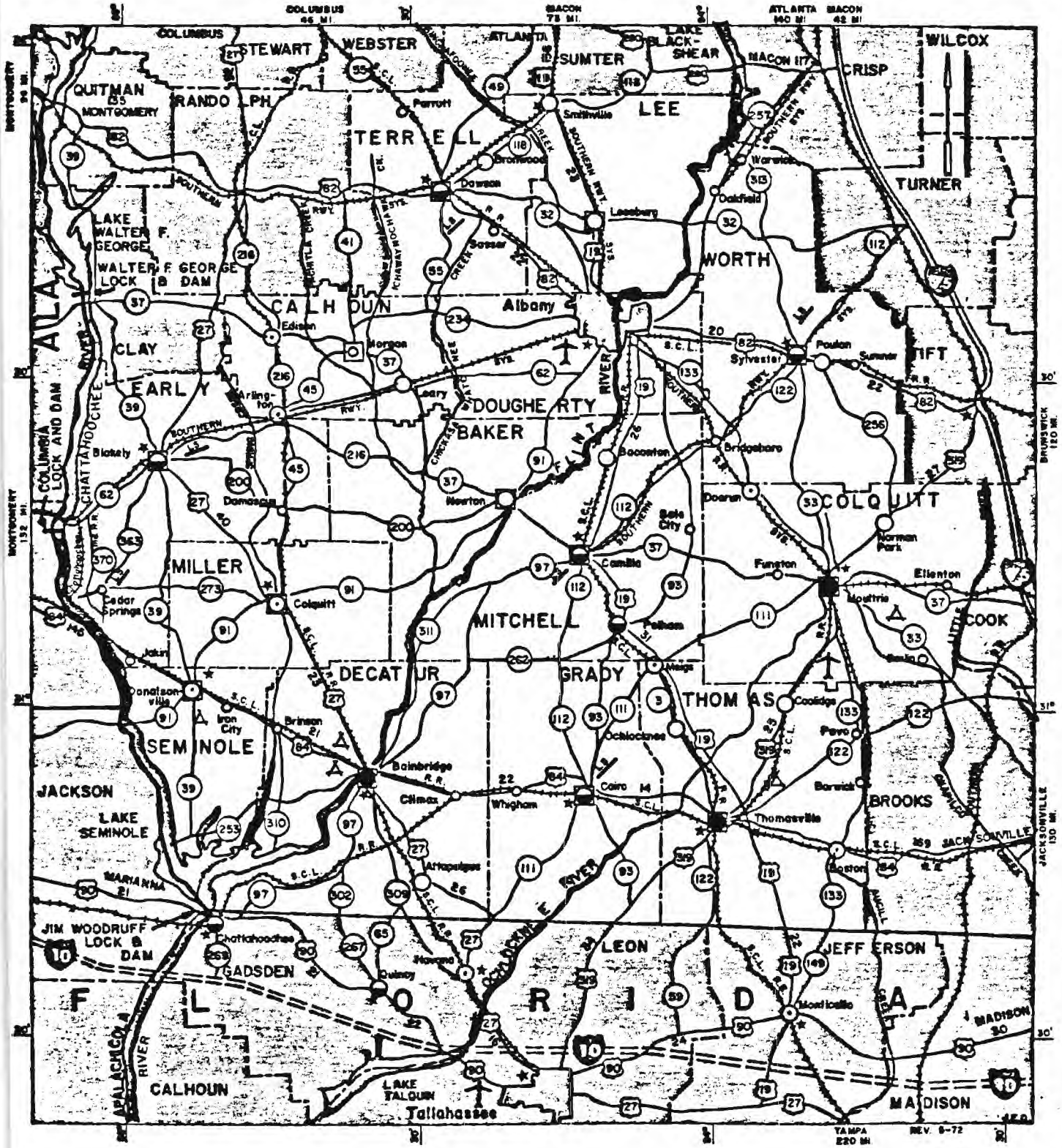
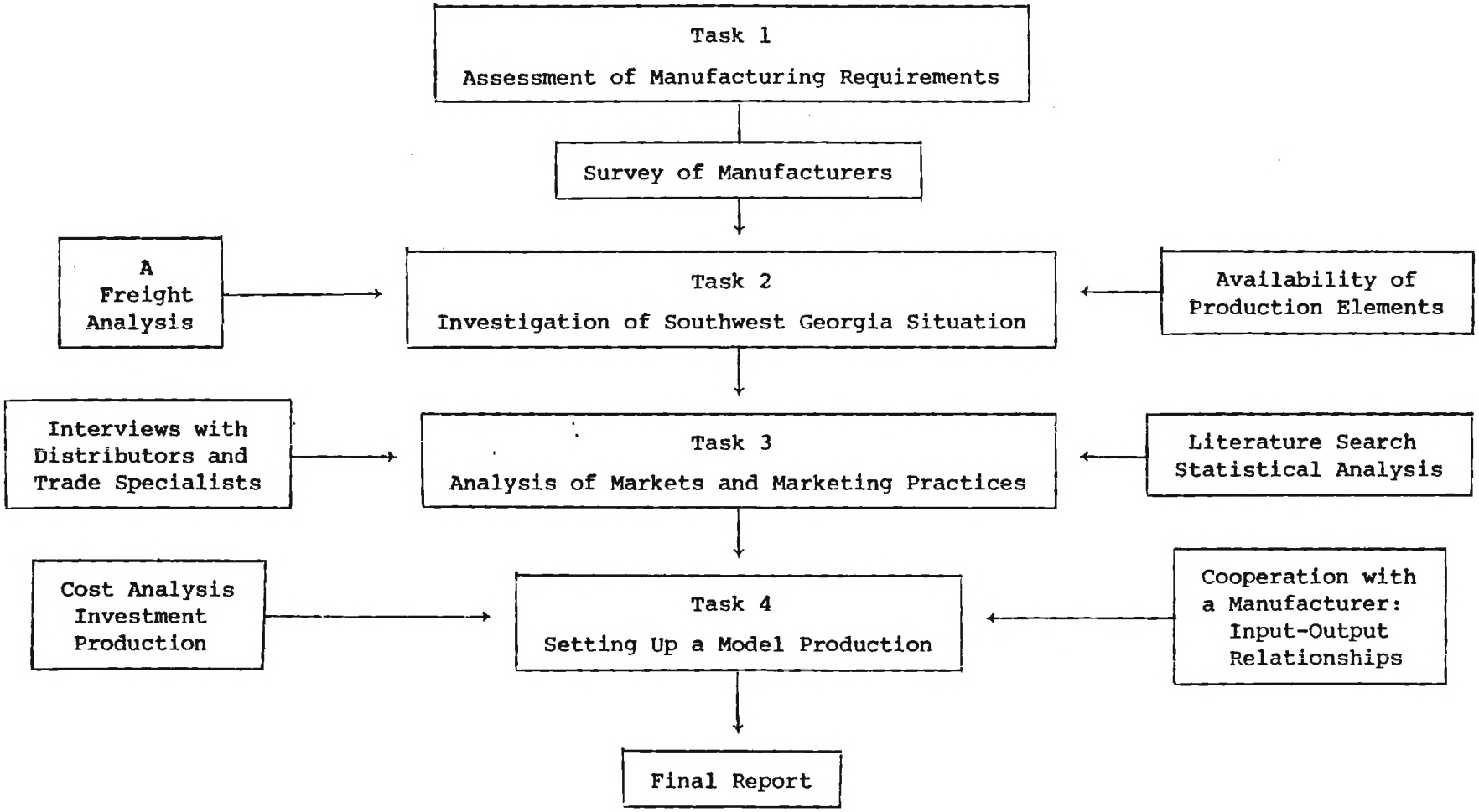


Figure 1

FLOW OF RESEARCH METHODOLOGY



beginning of this research project to determine (1) the end products involved, (2) the requirements of production elements, and (3) the intention of the manufacturers concerning their future expansion.

The second task investigated the availability of the production elements such as labor, materials and supplies, and power and fuels in Southwest Georgia. Other factors considered were the economic growth of the region, labor productivity and dependability, accessibility to markets, potential plant sites, and industrial financing and training programs.

The third task dealt with the analysis of markets and marketing practices. Published statistical data on food products machinery shipment value were correlated with the value of shipments of food and kindred products. Future trends based on these statistical series were projected, and the regional market of the Southeast was determined. Interviews with manufacturers, distributors, and trade specialists were conducted to learn about marketing practices.

The fourth task consisted of setting up a model production based on specific types of food products machinery. Through cooperation with a manufacturer, a model plant scale with specific end products as well as the input-output relationships of various production elements was obtained. Cost data on these production elements were collected, analyzed, and compared for two locations. Potential returns on the model production were estimated.

Organization of the Report

There are three major sections in this report. Section I covers the markets for food products machinery in the United States. All markets and marketing practices related to the food products machinery industry are described and analyzed. Section II presents the Southwest Georgia area as a location for the manufacture of food products machinery. Locational factors such as economic growth, material supplies, labor availability and dependability, wage rates, transportation, utilities, potential plant sites, and industrial financing and training programs are scrutinized. Section III contrasts a model food products machinery production in Albany, Georgia, and Chicago, Illinois, in terms of investment requirements, production costs, and projected returns.

THE MARKETS FOR FOOD PRODUCTS MACHINERY

National Trends

Food products machinery is defined as machinery or equipment used to process food materials and to pack processed food materials into containers for shipment. Food processing machinery constitutes about 60% to 70% of the total value of shipments by the food products machinery industry, while food packaging machinery constitutes about 30% to 40% of the shipments.

Because food products machinery is essential for the processing and packaging of food materials, the two industries are naturally related. This relationship can be established by comparing the value of shipments of both industries. The value of shipments of food products machinery (SIC 3551) and food and kindred products (SIC 20) from 1961 to 1976 is presented in Table 1 and Figure 1. The close relationship of the two industries in terms of value of shipments is clearly shown in Figure 1 and by the statistical inference presented at the end of Table 1.

The value of shipments of food and kindred products increased from $64,591 million in 1961 to $180,930 million in 1976, a 180% increase in 15 years with an annual growth rate of 7.1%, and is projected to reach $358,109 million by 1985, a 98% increase in nine years with an annual growth rate of 7.8%.

In contrast, the value of shipments of food products machinery increased from $588 million in 1961 to $1,542 million in 1976, a 162% increase in 15 years with an annual growth rate of 6.6%, and is projected to reach $3,037 million by 1985, a 97% increase in nine years with an annual growth rate of 7.8%. The similarities in the growth records of the two industries are evident.

The future growth of both food products machinery and food and kindred products in terms of the value of shipments is assured as long as people need to eat. However, the number of establishments and employees engaged in these two types of manufacturing presents a different picture. The number of establishments engaged in food processing has declined persistently -- from 35,768 units in 1964 to 24,550 units in 1975. On the other hand, the number of employees engaged in various food manufacturing activities has remained relatively stable at about one and a half million during the same period.

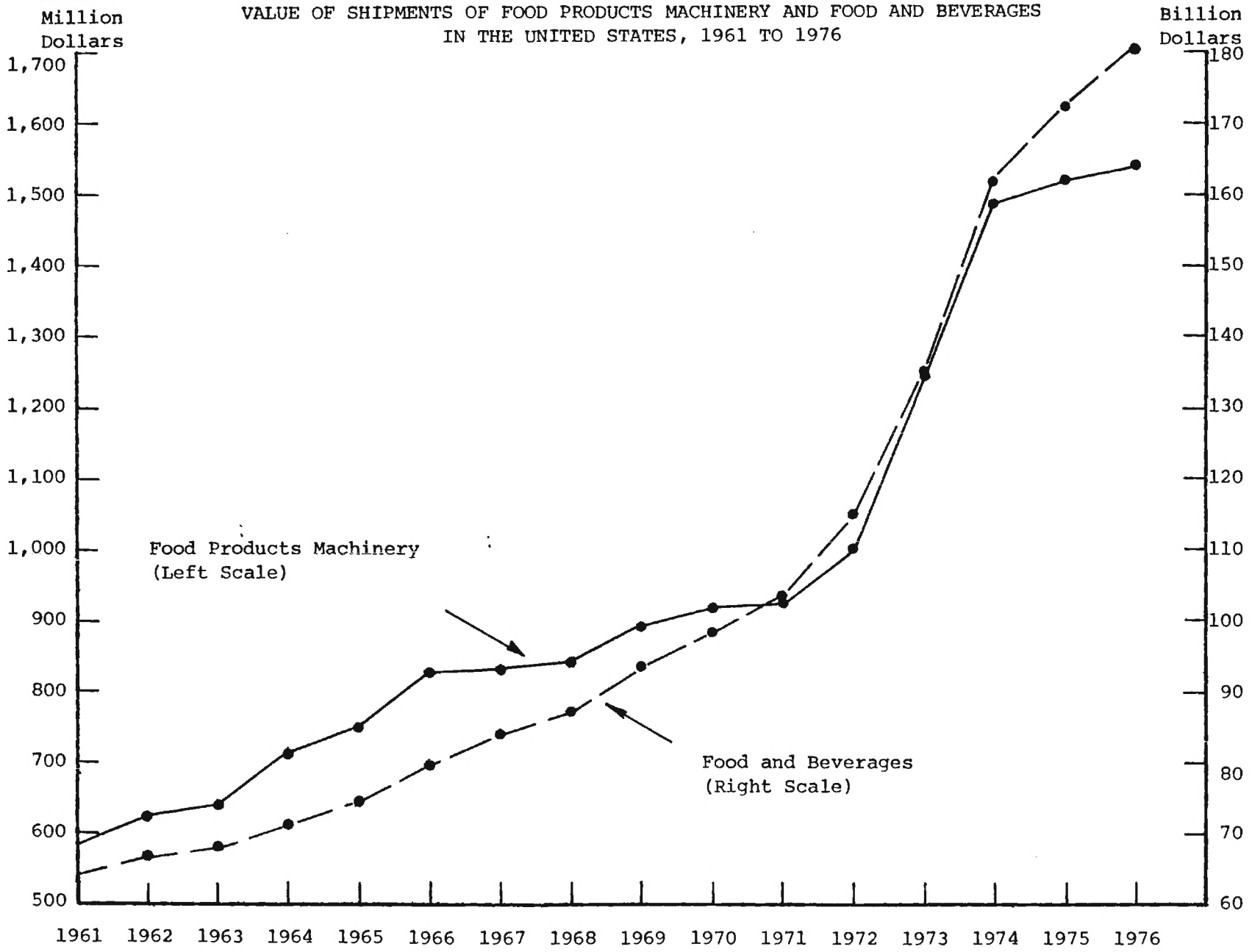

VALUE OF SHIPMENTS OF FOOD PRODUCTS MACHINERY AND FOOD AND BEVERAGES
IN THE UNITED STATES, 1961 TO 1976
Million Dollars
Billion Dollars
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
180
170
160
150
140
130
120
110
100
90
80
70
60
Food Products Machinery
(Left Scale)
Food and Beverages
(Right Scale)
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976

Table 1

VALUE OF SHIPMENTS OF FOOD PRODUCTS MACHINERY
AND FOOD AND KINDRED PRODUCTS IN THE UNITED STATES,
1961 TO 1976 AND PROJECTIONS TO 1980 AND 1985
(in million dollars)

Year	Food and Kindred Products SIC 20	Food Products Machinery SIC 3551
1961	64,591	588
1962	66,906	626
1963	68,466	640
1964	71,597	715
1965	74,248	750
1966	79,751	827
1967	83,975	830
1968	87,324	840
1969	93,380	891
1970	98,533	918
1971	103,631	922
1972	115,060	1,000
1973	135,582	1,241
1974	161,961	1,491
1975	172,510	1,521
1976	180,930	1,542
1980	238,997*	2,064**
1985	359,109*	3,037**

* Projected by the exponential equation: $Y = 60433.1\ (e^{0.080877X})$
$R = 0.9495$

** Projected by the linear correlation between food and kindred products (X) and food products machinery (Y)

Estimating equation: $Y = 112.056 + 0.00816799X$
Coefficient of correlation: $R = 0.986$

Source: U. S. Department of Commerce, Bureau of the Census, Annual Survey of Manufactures.

Projections made by Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology.

Between 1964 and 1975, the number of establishments and employees engaged in the production of food products machinery has shown slight variations from year to year with no clear trend of up or down. The number of establishments has remained over 600 and the employees have varied from 20,000 to 39,000. The details are given in Table 2.

Table 2

NUMBER OF ESTABLISHMENTS AND EMPLOYEES IN THE FOOD AND KINDRED PRODUCTS INDUSTRY AND THE FOOD PRODUCTS MACHINERY INDUSTRY IN THE UNITED STATES, 1964 TO 1975

	Food and Kindred Products, SIC 20			Food Products Machinery, SIC 3551		
Year	Number of Establishments	Number of Employees	Average No. of Employees per Establishment	Number of Establishments	Number of Employees	Average No. of Employees per Establishment
1964	35,768	1,538,558	43	650	30,629	47
1965	35,015	1,545,154	44	659	33,243	50
1966	33,860	1,572,174	46	657	35,757	54
1967	32,451	1,586,182	49	658	37,009	56
1968	30,864	1,578,775	51	630	32,803	52
1969	29,743	1,588,882	54	634	32,483	51
1970	28,579	1,595,472	56	638	34,599	54
1971	27,409	1,539,651	56	616	30,965	50
1972	26,455	1,536,307	58	605	30,449	50
1973	25,815	1,526,831	59	609	33,076	54
1974	25,383	1,540,199	61	664	39,189	59
1975	24,550	1,452,444	59	648	36,223	56

Source: U. S. Department of Commerce, Bureau of the Census, County Business Patterns.

The value of shipments for both industries has increased persistently while the number of employees has remained relatively stable, indicating that the productivity of labor has increased through industrial automation in both industries. Increasing labor productivity through greater use of capital machinery has been a common phenomenon in nearly all industries in the United States in the last three decades. The degree of automation varies according to the needs of a specific manufacturing process. Food manufacturing, in

general, is less capital intensive than many other industries such as steel, chemicals, and petroleum products. However, the degree of automation varies also within specific segments of the food processing industry. The lesser degree of automation in food processing today will provide a greater opportunity for future automation and machine sales.

The scale of operation of individual establishments tended to become larger during the 1964-1975 period. The average number of employees per establishment in both industries is given in Table 2. The average number of employees in the food and kindred products industry increased from 43 in 1964 to 59 in 1975, while the average number of employees in the food products machinery industry increased from 47 to 56 in the same period. However, the majority of establishments in both industries is small with less than 50 employees per establishment.

Market Outlets

The market outlets for food products machinery are organized along the line of food processing industries. According to the U. S. Department of Commerce, food processing is grouped into nine major standard industrial classifications (SIC). These nine SIC Codes and their value of shipments in 1976 are presented in Table 3. The value of shipments of total food and kindred products (SIC 20)

Table 3

VALUE OF SHIPMENTS OF FOOD AND KINDRED PRODUCTS
IN THE UNITED STATES, 1976 AND PROJECTION TO 1980 AND 1985
(in millions of dollars)

SIC Code	Industry	1976	1980	1985	Percent of Annual Growth Rate 1976-1985
20	Food and Kindred Products	$180,929.7	$238,997	$358,109	7.9
201	Meat Products	45,826.9	65,893	113,970	10.6
202	Dairy Products	24,830.3	27,946	32,818	3.2
203	Canned, Cured, and Frozen Foods	17,721.5	22,400	32,077	6.8
204	Grain Mill Products	21,189.1	30,574	48,973	9.7
205	Bakery Products	12,229.7	16,123	22,904	7.2
206	Sugar and Confectionery	10,405.0	12,173	15,020	4.2
207	Fats and Oils	12,801.2	16,161	21,922	6.2
208	Beverages	21,068.6	29,600	46,878	9.3
209	Miscellaneous Foods	14,857.3	18,127	23,547	5.2

Source: U. S. Department of Commerce, Bureau of the Census. Projections made by the Economic Development Division, Georgia Institute of Technology.

in the United States in 1976 was close to $181 billion. The components of this total are meat products (SIC 201), $45.8 billion or 25.3%; dairy products (SIC 202), $24.8 billion or 13.7%; canned, cured, and frozen foods (SIC 203), $17.7 billion or 9.8%; grain mill products, $21.2 billion or 11.7%; bakery products, $12.2 billion or 6.8%; sugar and confectioneries, $10.4 billion or 5.7%; fats and oils, $12.8 billion or 7.1%; beverages, $21 billion or 11.7%; and miscellaneous foods, $14.9 billion or 8.2%.

The value of shipments for the total food processing industry together with the nine subcategories were projected to 1980 and 1985 according to their respective trends since 1964, but adjusted according to the changes of product classification made on certain categories in certain years. (See Appendix 1.) The projections are given in Table 3. Food and kindred products (SIC 20), the entire food processing industry total, were projected to reach $238,997 billion by 1980 and $358,109 billion by 1985 with an annual growth rate of 7.9% between 1976 and 1985. The projected value of shipments of the nine subcategories of food processing is presented in the same table. The projected annual growth rate varies for each subcategory: meat products, 10.6%; dairy products, 3.2%; canned, cured, and frozen foods, 6.8%; grain mill products, 9.7%; bakery products, 7.2%; sugar and confectionery products, 4.2%; fats and oils, 6.2%; beverages, 9.3%; and miscellaneous foods such as potato chips, coffee, peanut butter, etc., 5.2%.

Meat products, grain mill products, and beverages have outstanding growth potential according to the projections. Meat products have been the major food of American people since the end of World War II, and per capita consumption of meat in the nation has increased steadily. The high growth potential of grain mill products may be explained by the increasing volume of exports of grains and flour. In the foreseeable future, the United States will continue to play a major role in feeding the world. The phenomenal growth of beverage sales (soft drinks and liquors) in the last few decades reflects an affluent society in the United States. The trend is expected to continue.

An analysis of detailed shipments of subcategories (seven-digit SICs) in 1967 and 1972 reveals that the sales of food products machinery were quite consistent with the sales of food and kindred products. The U. S. shipments of food products machinery were estimated on the basis of those of the food processing industries and are presented in Table 4. The food products machinery

Table 4

FOOD PRODUCTS MACHINERY:
ESTIMATED VALUE OF SHIPMENTS TO FOOD PROCESSING INDUSTRIES
IN THE UNITED STATES, 1976, 1980, AND 1985
(in millions of dollars)

SIC Code	Industry	1976		1980		1985	
20	Total Food Processing Industries	$1,542.5*	100.0%	$2,064	100.0%	$3,037	100.0%
201	Meat Products	347.1	22.5	517	25.0	865	28.5
202	Dairy Products	177.4	11.5	200	9.7	237	7.8
203	Canned, Cured, and Frozen Foods	169.7	11.0	220	10.7	307	10.1
204	Grain Mill Products	100.2	6.5	145	7.0	232	7.6
205	Bakery Products	115.7	7.5	152	7.3	215	7.1
206	Sugar and Confectionery	54.0	3.5	63	3.1	78	2.6
207	Fats and Oils	103.3	6.7	130	6.3	176	5.8
208	Beverages	282.3	18.3	402	19.5	620	20.4
209	Miscellaneous Foods	192.8	12.5	235	11.4	307	10.1

* U. S. Department of Commerce, Bureau of the Census, Annual Survey of Manufactures.

Source: Estimates made by the Economic Development Division, Georgia Institute of Technology.

industry's shipment total was $1,542.5 million in 1976, of which 22.5% went to meat products processing; dairy products 11.5%; canned, cured, and frozen foods 11%; grain mill products 6.5%; bakery products 7.5%; sugar and confectionery 3.5%; fats and oil 6.7%; beverages 18.3%; and miscellaneous foods 12.5%. The detailed dollar volume on each category is given in Table 4. These shipments represent the value shipped by food products machinery manufacturers -- not distributors' shipment value. The value of shipments includes shipments to both domestic and foreign markets. (See next section on foreign trade.)

The value of shipments of food products machinery was projected to reach $2,064 million by 1980 and $3,037 million by 1985. Because the projected growth of food products machinery was based largely on the growth rates projected for the food processing industries, the machinery shipments for meat products, grain

mill products, and beverages are among the highest growth items, followed by the machinery shipped for bakery products; canned, cured, and frozen foods; fats and oils; miscellaneous foods; sugar and confectionery; and dairy products. The detailed dollar volume on the machinery shipped is given in Table 4.

Although the dollar volume for each market outlet is expected to increase, the relative importance of each market outlet will change with time. The market outlet for meat products constituted 22.5% of the total food machinery shipments in 1976. It was projected to increase to 25% by 1980 and to 28.5% by 1985. In contrast, the machinery market outlet for dairy products constituted 11.5% in 1976, and it was projected to decline to 9.7% by 1980 and to 7.8% by 1985. The relative importance of each market outlet together with projected dollar volume is given in Table 4.

International Trade

International trade constitutes an important part of the food products machinery market in the United States. In 1976, exports comprised about 32.5% of the total value of food products machinery shipments (or U. S. production), and imports constituted about 15% of the U. S. domestic market (or consumption). In 1977, exports comprised about 31% of the U. S. production, and imports constituted about 16% of the U. S. market. The details are given in Table 5.

Table 5

U. S. VALUE OF SHIPMENTS, EXPORTS, IMPORTS, AND DOMESTIC MARKET OF FOOD PRODUCTS MACHINERY, 1976 AND 1977
(in millions of dollars)

	Value of Shipments or U. S. Production	Exports	Imports	Domestic Market
1976	$1,542	$501	$183	$1,224
1977	1,681*	519	221	1,383

* Preliminary.

Note: Domestic Market = U. S. Production - Exports + Imports.

Source: U. S. Department of Commerce, Bureau of the Census.

Detailed U. S. exports of food products machinery by major countries in 1976 and 1977 are given in Tables 6 and 7. Food processing machinery constituted about 52% to 54% of the export total, while food packaging machinery comprised 46% to 48% of the total. Canada, Mexico, Venezuela, United Kingdom, and Japan are the major destinations for U. S. exports. Canada has been the leading purchaser of U. S. food products machinery for years, followed by Mexico and Venezuela. Countries in the American continent comprised most of the U. S. exports, followed by western European nations and Asian countries.

Table 6

U. S. EXPORTS OF FOOD PROCESSING
AND FOOD PACKAGING MACHINERY BY MAJOR COUNTRIES, 1976
(in millions of dollars)

Country	Processing Machinery	Packaging Machinery	Total
Canada	$ 39.7	$ 45.9	$ 85.6
Mexico	21.5	21.5	43.0
Venezuela	24.5	16.9	41.4
Panama	28.5	0.8	29.3
United Kingdom	10.1	15.0	25.1
Japan	10.1	12.1	22.2
Netherlands	10.1	7.1	17.2
Iran	9.1	5.8	14.9
Brazil	8.1	6.6	14.7
Australia	5.4	8.9	14.3
West Germany	4.3	8.6	12.9
Philippines	8.8	3.2	12.0
France	5.0	6.2	11.2
Others	88.1	69.5	157.6
Total	$273.3	$228.1	$501.4

Source: U. S. Department of Commerce, Bureau of the Census, Foreign Trade Division, U. S. Export Commodity by Country, FT-410, December 1976.

Table 7

U. S. EXPORTS OF FOOD PROCESSING
AND FOOD PACKAGING MACHINERY BY MAJOR COUNTRIES, 1977
(in millions of dollars)

Country	Processing Machinery	Packaging Machinery	Total
Canada	$ 42.0	$ 46.7	$ 88.7
Venezuela	25.4	19.7	45.1
Mexico	19.7	15.4	35.1
United Kingdom	10.5	21.1	31.6
Japan	11.9	16.2	28.1
Netherlands	12.5	9.5	22.0
West Germany	5.7	12.9	18.6
Australia	8.1	10.1	18.2
Brazil	10.4	5.8	16.2
Ecuador	10.8	1.8	12.6
France	4.0	7.7	11.7
Others	109.5	81.9	191.4
Total	$270.5	$248.8	$519.3

Source: U. S. Department of Commerce, Bureau of the Census, Foreign Trade Division, U. S. Export Commodity by Country, FT-410, December 1977.

U. S. imports of food products machinery were $183 million in 1976 and $221 million in 1977. Food processing machinery constituted about one third of the imports while food packaging machinery comprised about two thirds. West Germany, Switzerland, Italy, United Kingdom, and Canada are the major exporters. Detailed import volume by major countries in 1976 and 1977 are given in Tables 8 and 9.

The U. S. food products machinery industry is the largest and most advanced in the world. As a result, the exports of U. S. food products machinery are

Table 8

U. S. IMPORTS OF FOOD PROCESSING
AND FOOD PACKAGING MACHINERY BY MAJOR COUNTRIES, 1976
(in millions of dollars)

Country	Processing Machinery	Packaging Machinery	Total
West Germany	$22.7	$ 34.7	$ 57.4
Switzerland	3.6	24.0	27.6
Italy	3.0	17.4	20.4
United Kingdom	4.1	11.4	15.5
Canada	4.1	11.1	15.2
Japan	3.6	6.7	10.3
Netherlands	4.9	3.8	8.7
France	1.2	4.4	5.6
Australia	3.8	-	3.8
Others	9.7	8.9	18.6
Total	$60.7	$122.4	$183.1

Source: U. S. Department of Commerce, Bureau of the Census, Foreign Trade Division, U. S. Import Commodity by Country, FT-246, December 1976.

Table 9

U. S. IMPORTS OF FOOD PROCESSING
AND FOOD PACKAGING MACHINERY BY MAJOR COUNTRIES, 1977
(in millions of dollars)

Country	Processing Machinery	Packaging Machinery	Total
West Germany	$30.5	$ 46.5	$ 77.0
Switzerland	6.2	31.2	37.4
Italy	5.1	14.1	19.2
United Kingdom	5.2	9.8	15.0
Canada	3.3	11.3	14.6
Japan	4.1	10.0	14.1
Netherlands	7.6	4.8	12.4
France	1.3	4.2	5.5
Denmark	3.9	0.5	4.4
Sweden	1.0	3.0	4.0
Others	9.9	7.3	17.2
Total	$78.1	$142.7	$220.8

Source: U. S. Department of Commerce, Bureau of the Census, Foreign Trade Division, U. S. Import Commodity by Country, FT-246, December 1977.

expected to increase. In many foreign countries, convenience foods, frozen foods, and soft drinks have become as popular as in the United States. Tight labor markets and increasing wage rates, particularly in western Europe and Japan, encourage increased automation in food processing. Developing countries in Central and South American and Southeast Asia are diversifying and upgrading their local food supplies through automation. All these factors stimulate the sales of U. S. food products machinery abroad. However, U. S. manufacturers of food products machinery have increasing competition from producers in western Europe and Japan, which is evident by the increased number of imports. In general, U. S. food products machinery industry's foreign and domestic market outlook is healthy.

Regional Market in the Southeast

A seven-state region in the Southeast, consisting of Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee, is of special interest to this study because of its close proximity to Southwest Georgia. The value of shipments of food and kindred products was used again as the basis for making the estimates on the value of shipments of food products machinery in this region. Table 10 presents the value of shipments of food and kindred products in the seven southeastern states between 1964 and 1975. The shipments increased from $7.2 billion in 1964 to $21.3 billion in 1975. The seven-state total as a percent of the United States total increased persistently from 10.01% in 1964 to 12.35% in 1975. Details are given in Table 10.

Projected value of shipments of food and kindred products in the seven southeastern states for 1980 and 1985 are given in Table 11. The projections were based on the past trends in each state as given in Table 10; the equations used in the projections are included at the end of Table 11. The shipments in the region were projected to reach $31.5 billion or 13.18% of the U. S. total by 1980 and $51.2 billion or 14.3% of the U. S. total by 1985. The details of each individual state are given in Table 11.

Estimated value of shipments of food products machinery in the seven southeastern states is given in Table 12. The estimates were based on the U. S. domestic market (about 80% of the U. S. value of shipments) and the ratio of each state's food and kindred products shipments to the U. S. total. The value

Table 10

VALUE OF SHIPMENTS OF FOOD AND KINDRED PRODUCTS IN SEVEN SOUTHEASTERN STATES AND THE UNITED STATES, 1964 TO 1975
(in millions of dollars)

State	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Alabama	773.7	797.4	888.9	918.2	947.2	1,030.3	1,089.2	1,047.7	1,355.6	1,714.1	2,033.2	2,187.3
Florida	1,547.5	1,560.5	1,652.7	1,873.1	2,026.5	2,177.5	2,462.9	2,693.8	3,020.2	3,512.8	4,053.2	4,602.5
Georgia	1,544.3	1,657.0	1,836.8	1,914.8	1,947.7	2,099.6	2,313.1	2,453.1	2,640.1	3,504.1	4,214.0	4,525.8
Mississippi	517.2	615.9	657.0	664.3	703.5	733.0	792.7	824.2	956.3	1,219.3	1,412.5	1,526.5
North Carolina	1,061.8	1,121.5	1,234.2	1,308.5	1,350.6	1,518.9	1,679.0	1,832.8	2,025.3	2,438.3	2,953.8	3,176.5
South Carolina	293.2	327.5	413.7	377.6	420.4	461.7	459.1	495.6	573.7	681.0	804.0	895.1
Tennessee	1,430.5	1,540.0	1,694.5	1,769.2	1,859.3	1,936.4	2,193.9	2,403.5	2,595.1	3,285.0	4,136.0	4,397.3
Seven-State	7,168.2	7,619.8	8,377.8	8,825.7	9,255.2	9,957.4	10,989.9	11,750.7	13,166.3	16,354.6	19,606.7	21,311.0
United States	71,597	74,248	79,751	83,975	87,324	93,380	98,533	103,631	115,060	135,582	161,961	172,510
Seven-State as a % of U. S.	10.01	10.26	10.50	10.51	10.60	10.66	11.15	11.34	11.44	12.06	12.11	12.35

Source: U. S. Department of Commerce, Bureau of the Census, Annual Survey of Manufactures.

Table 11

VALUE OF SHIPMENTS OF FOOD AND KINDRED PRODUCTS IN SEVEN SOUTHEASTERN STATES AND THE UNITED STATES, 1975 AND PROJECTION TO 1980 AND 1985
(in millions of dollars)

State	1975 Value of Shipments	1975 Percent of U. S.	1980 Value of Shipments	1980 Percent of U. S.	1985 Value of Shipments	1985 Percent of U. S.
Alabama	$ 2,187	1.27	$ 3,092	1.29	$ 4,936	1.38
Florida	4,602	2.67	7,118	2.98	11,864	3.31
Georgia	4,526	2.62	6,508	2.72	10,467	2.92
Mississippi	1,526	0.88	2,180	0.91	3,439	0.96
North Carolina	3,176	1.84	4,809	2.01	7,709	2.15
South Carolina	895	0.52	1,290	0.54	2,048	0.57
Tennessee	4,397	2.55	6,529	2.73	10,780	3.01
Seven-State Total	$ 21,309	12.35	$ 31,526	13.18	$ 51,243	14.30
U. S.	$172,510	100.00	$238,997	100.00	$358,109	100.00

State	Estimating Equation	Coefficient of Correlation
Alabama	$Y = 630.192\ (e^{.035607X})$	R = 0.894802
Florida	$Y = 1252.96\ (e^{.102181X})$	R = 0.978217
Georgia	$Y = 1295.87\ (e^{.049361X})$	R = 0.915182
Mississippi	$Y = 462.566\ (e^{.011856X})$	R = 0.921033
North Carolina	$Y = 886.204\ (e^{.094934X})$	R = 0.966724
South Carolina	$Y = 268.115\ (e^{.024064X})$	R = 0.939607
Tennessee	$Y = 1186.38\ (e^{.10031X})$	R = 0.92593

Source: U. S. Department of Commerce, Bureau of the Census, Annual Survey of Manufactures.

Projection made by the Economic Development Division, Georgia Institute of Technology, based on data given in Table 10.

Table 12

ESTIMATED VALUE OF SHIPMENTS OF FOOD PRODUCTS MACHINERY IN SEVEN SOUTHEASTERN STATES AND THE UNITED STATES IN 1975 AND PROJECTION TO 1980 AND 1985 (in millions of dollars)

State	1975	1980	1985
Alabama	$ 15.5	$ 21.3	$ 33.5
Florida	32.5	49.2	80.4
Georgia	31.7	44.9	71.0
Mississippi	10.7	15.0	23.4
North Carolina	22.4	33.2	52.2
South Carolina	6.3	9.0	13.8
Tennessee	31.0	45.0	73.1
Seven-State Total	$ 150.1	$ 217.6	$ 347.4
U. S. Domestic Market	$1,217.0	$1,651.0	$2,430.0

of shipments of food products machinery in the seven states was estimated at $150 million in 1975 and was projected to reach $217 million by 1980 and $347 million by 1985. The share of the region to the U. S. total would increase from 12.35% in 1975 to 13.18% by 1980 and to 14.3% by 1985.

Although the shipments of food products machinery in the seven southeastern states cannot be broken down according to market outlets because of the incompleteness of the data, a general idea of relative strength of each market outlet in the region can be gleaned by reviewing available data on the number of employees and value of shipments of food processing industries in the respective states. Table 13 presents the number of employees by different food processing industries in the seven states and the United States in 1975. Table 14 gives the value of shipments by the different food processing industries in the same states in 1975. Three food processing industries -- meat products, fats and oils, and bakery products -- are especially strong in the region. Beverages; miscellaneous foods; and cured, canned, and frozen products are also strong in the region. Relatively weak industries in the region are dairy products, grain mill products, and sugar and confectionery.

Some industries are especially strong in certain states: meat products in Georgia; canned, cured, and frozen products in Florida; bakery products in

Table 13

NUMBER OF EMPLOYEES ENGAGED BY FOOD PROCESSING INDUSTRIES IN SEVEN SOUTHEASTERN STATES AND THE UNITED STATES, 1975

Food Processing Industry	Alabama	Florida	Georgia	Mississippi	North Carolina	South Carolina	Tennessee	United States
Food and Kindred Products	22,566	48,506	44,051	17,142	36,058	11,654	35,340	1,452,444
Meat Products	7,616	5,321	14,187	8,408	10,617	2,240	7,463	300,177
Dairy Products	2,612	3,931	2,765	1,532	2,830	1,485	3,326	164,392
Canned, Cured, and Frozen Products	1,101	15,325	2,684	N. A.	1,559	N. A.	2,064	189,606
Grain Mill Products	1,931	1,023	2,795	929	2,332	613	544	122,769
Bakery Products	2,907	6,454	8,032	1,290	9,944	1,768	7,413	218,080
Sugar and Confectionery	421	3,082	3,605	N. A.	375	N. A.	1,028	95,165
Fats and Oils	956	385	1,322	1,755	955	560	2,015	42,998
Beverages	3,165	6,476	N. A.	1,803	N. A.	2,267	5,091	195,396
Miscellaneous	1,857	6,489	3,593	1,064	1,972	497	2,803	132,957

N. A. = Not available.

Source: U. S. Department of Commerce, Bureau of the Census, County Business Patterns, 1976.

Table 14

VALUE OF SHIPMENTS BY FOOD PROCESSING INDUSTRIES IN SEVEN SOUTHEASTERN STATES AND THE UNITED STATES, 1975

Food Processing Industry	Alabama	Florida	Georgia	Mississippi	North Carolina	South Carolina	Tennessee	United States
Food and Kindred Products	$2,187	$4,602	$4,526	$1,526	$3,176	$895	$4,397	$172,158
Meat Products	667	601	1,138	637	925	N. A.	977	43,817
Dairy Products	194	467	352	N. A.	333	N. A.	349	22,668
Canned, Cured, and Frozen Products	N. A.	1,212	160	N. A.	N. A.	N. A.	N. A.	16,804
Grain Mill Products	N. A.	N. A.	N. A.	N. A.	N. A.	N. A.	700	20,661
Bakery Products	154	272	476	N. A.	N. A.	N. A.	297	11,730
Sugar and Confectionery	N. A.	531	581	N. A.	N. A.	N. A.	N. A.	11,423
Fats and Oils	N. A.	N. A.	N. A.	N. A.	N. A.	N. A.	N. A.	12,781
Beverages	192	692	594	N. A.	613	N. A.	569	20,395
Miscellaneous	N. A.	562	192	N. A.	N. A.	N. A.	230	11,877

N. A. = Not available.

Source: U. S. Department of Commerce, Bureau of the Census, Annual Survey of Manufactures, 1976.

Georgia and North Carolina; fats and oils in Mississippi and Georgia; beverages in Florida, Georgia, and Tennessee; and miscellaneous foods in Florida.

Marketing Practices

Because of the diversity in food processing and its production conditions, the manufacture of food products machinery is done largely on a custom design basis. The design of a processing system, machine specifications, and intended operating results have to be pre-engineered. This engineering service including detailed blueprints can be supplied by food products machinery manufacturers, or food processing companies (end users), or consulting houses. Large food processing companies have their own engineering departments to provide research, development, and engineering services. These large food companies may parcel out a portion of a designed processing system to different food products machinery fabricators so that the design secret of a complete system can be protected. Under this arrangement, food products machinery companies provide only fabrication services without getting into costly design and developmental work.

On the other hand, some food processing companies have to rely on outside services for their design and engineering needs. Consulting houses can provide a turn-key job including engineering design, machinery order, and start-up operation.

Most food products machinery companies have engineering and design capabilities to service their customers. The selling of food products machinery requires a high level of food product and engineering knowledge. The seller and end user must usually work in close cooperation.

Some companies specialize in the manufacture of standard items (stock items or catalog items) such as pumps, pipes, tubings, module units, etc., without the need of custom design for individual end users. These stock items can be distributed widely through the use of sales agents. The mark-up on stock items by manufacturers is generally low, compared with proprietary items which require custom design and engineering.

The bulk of food products machinery is sold directly by manufacturers to end users because of the need for engineering design. However, distributors or sales agents on a commission do a sizable business in selling food products machinery, especially in the field of international trade where an intermediate contact is needed in order to facilitate a trade. Some large manufacturers

maintain sales offices throughout the nation. Others use sales agents or representatives for making contacts. The commission fee is generally 10% to 15% of the sale price.

Food products machinery manufacturers generally sell their products on an f.o.b. basis. However, they often are willing to pay for freight equalization costs in order to compete with other manufacturers located nearer to a customer.

Manufacturing Plant Distribution

The number of establishments engaged in the manufacture of food products machinery in the United States varied between 600 and 650 in the last decade. The distribution of these manufacturing units by state in 1975 is presented in Table 15 and Map 2. The distribution is highly concentrated in California, Illinois, New York, Wisconsin, Ohio, Pennsylvania, New Jersey, and Texas.

Since food products machinery is necessary for the processing of most food materials, the distribution by state of food processing plants and food products machinery establishments is given in Table 15. Map 3 shows the number of food processing plants by state in the United States. Food processing plants are more evenly distributed among the states according to population than is the case of food products machinery establishments. Those states with over 500 food processing plants include California, New York, Pennsylvania, Texas, Illinois, Wisconsin, Ohio, New Jersey, Michigan, Minnesota, Massachusetts, Missouri, Florida, Georgia, Iowa, Louisiana, and North Carolina.

In the seven southeastern states -- Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee -- 45 food products machinery establishments were operating in 1975, or about 7% of the national total of 631. In contrast, there were 3,132 food processing plants in the seven states, or about 12.7% of the U. S. total of 24,651 in the same year. In view of the increasing share of food processing activities in the Southeast projected for 1980 and 1985, it is an appropriate time to look closely at the advantages Southwest Georgia can offer as a location for the manufacture of food products machinery.

Table 15

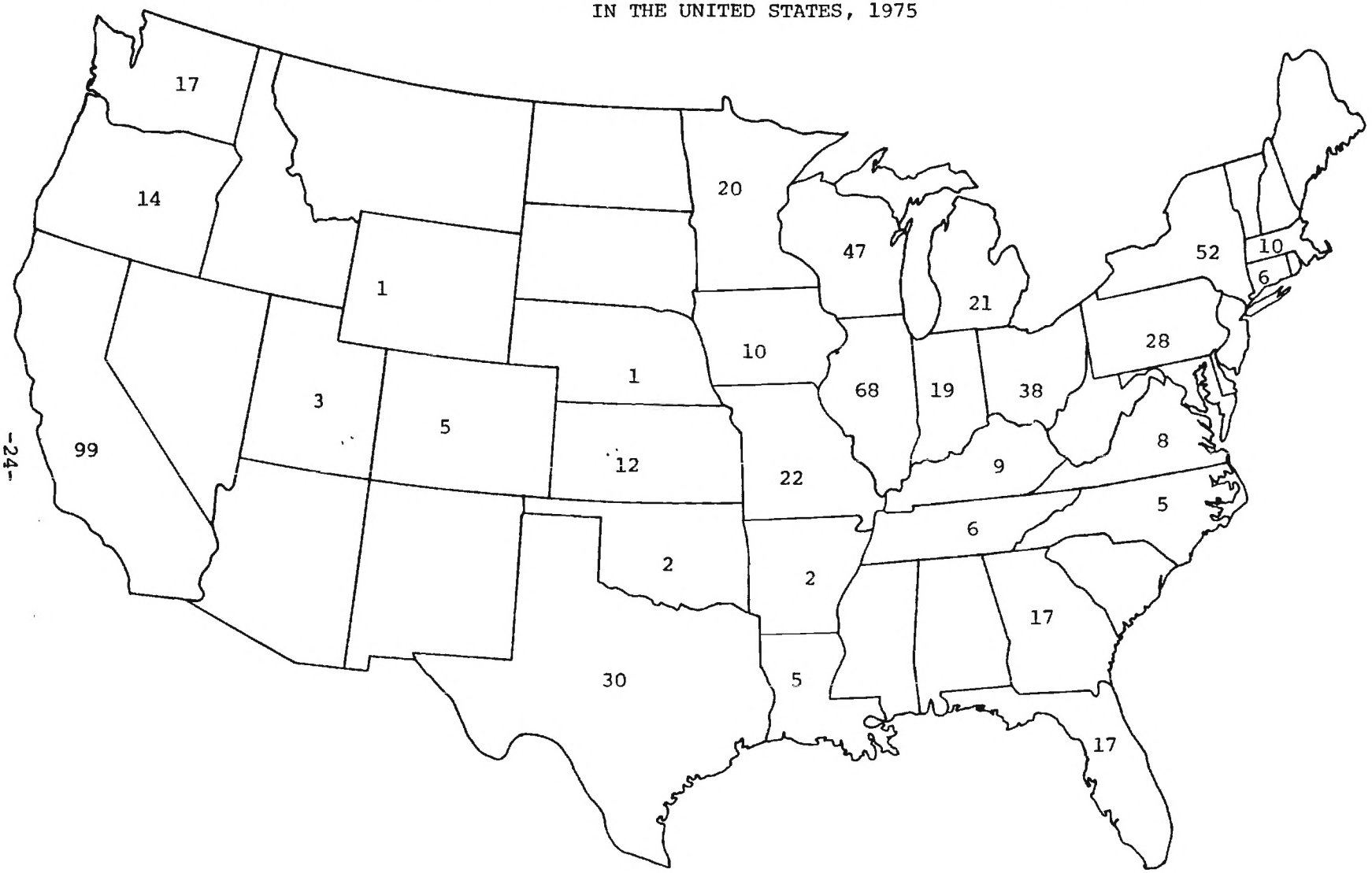
NUMBER OF ESTABLISHMENTS ENGAGED IN THE MANUFACTURE OF FOOD PRODUCTS MACHINERY (SIC 3551) AND FOOD AND KINDRED PRODUCTS (SIC 20) IN THE UNITED STATES, BY STATE, 1975

State	SIC 3551	SIC 20	State	SIC 3551	SIC 20
Alabama	-	351	Montana	-	128
Alaska	-	91	Nebraska	1	399
Arizona	-	158	Nevada	-	48
Arkansas	2	320	New Hampshire	-	94
California	99	2,334	New Jersey	26	710
Colorado	5	334	New Mexico	-	120
Connecticut	6	260	New York	52	1,740
Delaware	-	68	North Carolina	5	597
District of Columbia	-	20	North Dakota	-	131
Florida	17	664	Ohio	38	1,060
Georgia	17	565	Oklahoma	2	293
Hawaii	-	206	Oregon	14	379
Idaho	-	169	Pennsylvania	28	1,494
Illinois	68	1,203	Rhode Island	-	159
Indiana	19	519	South Carolina	-	216
Iowa	10	577	South Dakota	-	117
Kansas	12	352	Tennessee	6	454
Kentucky	9	339	Texas	30	1,329
Louisiana	5	506	Utah	3	183
Maine	-	243	Vermont	-	87
Maryland	11	402	Virginia	8	481
Massachusetts	10	605	Washington	17	484
Michigan	21	771	West Virginia	-	124
Minnesota	20	670	Wisconsin	47	1,140
Mississippi	-	285	Wyoming	1	65
Missouri	22	607	U. S. Total	631	24,651

Source: U. S. Department of Commerce, Bureau of the Census, County Business Patterns, 1975.

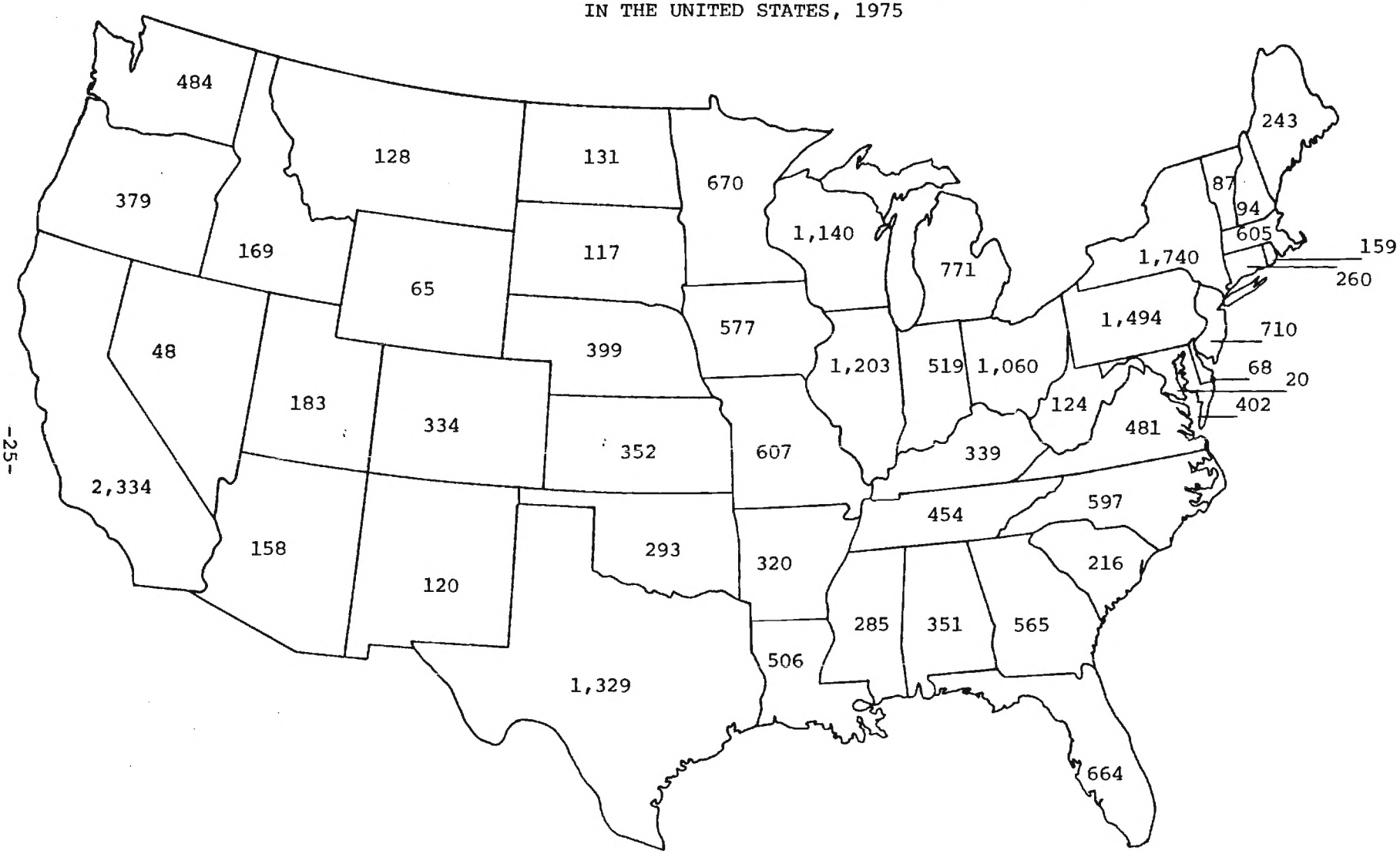
Map 2

NUMBER OF ESTABLISHMENTS ENGAGED IN THE MANUFACTURE OF FOOD PRODUCTS MACHINERY IN THE UNITED STATES, 1975



Map 3

NUMBER OF ESTABLISHMENTS ENGAGED IN THE MANUFACTURE OF FOOD AND KINDRED PRODUCTS IN THE UNITED STATES, 1975



THE FEASIBILITY OF A SOUTHWEST GEORGIA LOCATION FOR FOOD PRODUCTS MACHINERY MANUFACTURE

In order to evaluate objectively the overall desirability of Southwest Georgia as a location for food products machinery manufacture, it is important to assess the major characteristics of the area in which the manufacture may take place. This is an important perspective because the distribution of manufacturing in the United States has been undergoing significant change since the end of World War II. Growth has occurred in areas characterized by desirable attributes such as available and dependable labor, improved access to materials and markets, gentle climatic and working conditions, and other benefits. In this context, the following nine sections deal with economic growth, labor, wages and labor productivity, materials and supplies, transportation, power and fuels, accessibility to markets, plant sites, and education and training facilities.

Relative Growth of the Southeast

The growth record of a region should provide a prospective plant location planner with a brief overview of the overall economic conditions of the area under consideration before he begins serious investigations on such specific matters as labor, wages, material supply, etc. For this reason, the following 13 major elements were chosen to reflect the economic activities of the Southeast: population, nonagricultural employment, manufacturing employment, construction employment, total personal income, per capita personal income, total long-term savings of individuals, wholesale sales, retail sales, value added by manufacture, new plant investment, installed capacity of electric utilities, and new automobile registration. The detailed data relating to these elements in seven southeastern states from 1950 to the latest available year are given in Appendices 2 to 14.

The economic growth of these elements in the seven southeastern states compared with the United States is given in Table 16. From 1950 to 1972, 1975 or 1976, depending upon the availability of data, the percentage growth for the region in each selected element is compared with the United States. The growth in the region exceeded that of the nation in all categories by large margins. In looking at major elements such as nonagricultural employment, manufacturing employment, construction employment, total personal income, long-term

Table 16

RELATIVE GROWTH OF SEVEN SOUTHEASTERN STATES
COMPARED WITH THE UNITED STATES, 1950-1976

Item	Period	Percent Increase	
		Seven Southeastern States[1/]	U. S.
Population	1950-75	53	42
Nonagricultural Employment	1950-72	118	61
Manufacturing Employment	1950-72	86	25
Construction Employment	1950-72	131	36
Total Personal Income	1950-76	840	482
Per Capita Personal Income	1950-76	441	328
Total Long-Term Savings of Individuals	1950-75	1,351	785
Wholesale Sales	1954-72	294	190
Retail Sales	1950-76	553	370
Value Added by Manufacture	1950-76	718	388
New Plant Investment	1950-75	410	380
Installed Capacity of Electric Utilities	1950-75	1,045	661
New Auto Registration	1959-75	67	37

1/ Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee.

Source: See Appendices 2-14.

individual savings, value added by manufacture, and installed capacity of electric utilities, the regional increases were twice or several times that of the U. S. increases during the past two to three decades.

Because of the faster rate of economic growth in the southeastern region compared with the nation as a whole, the regional share of the U. S. total in all 13 categories has registered significant increases and the trends are persistent. Detailed ratios on the economic elements of the seven southeastern states as a percent of the U. S. totals from 1950 to 1976 are presented in Table 17.

Table 17

ECONOMIC GROWTH OF SEVEN SOUTHEASTERN STATES[1/] AS A PERCENT OF UNITED STATES TOTAL, 1950-1976

Item	1950	1960	1970	1972	1975	1976
Population	13.8	13.9	14.1	-	-	14.9
Nonagricultural Employment	10.2	11.5	12.8	13.7	-	-
Manufacturing Employment	10.2	11.8	14.6	15.3	-	-
Construction Employment	11.6	13.5	18.4	19.8	-	-
Total Personal Income	9.2	9.9	11.4	-	-	14.8
Per Capita Personal Income	65.6	69.4	78.9	-	-	83.0
Total Long-Term Savings of Individuals	6.8	8.5	9.9	-	11.1	-
Wholesale Sales[2/]	9.1	9.5	10.8	12.4	-	-
Retail Sales	10.0	11.4	12.8	-	-	13.9
Value Added by Manufacture	7.7	9.2	11.9	-	-	12.9
New Plant Investment	9.5	11.6	14.1	-	15.4	-
Installed Capacity of Electric Utilities	12.1	15.0	16.0	-	18.2	-
New Auto Registration[3/]	11.5	12.9	13.4	-	14.1	-

1/ Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee.

2/ Reflecting the years of 1954, 1958, 1967, and 1972, respectively.

3/ Reflecting the years of 1959, 1966, 1969, and 1975, respectively.

Sources: Appendices 2-14.

Availability of Labor Requirements

Because of the diversity of the product lines in food products machinery, labor requirements are also varied. However, the labor requirements of the food products machinery manufacture are generally consistent with other types of metalworking industries. A profile of skilled and nonskilled workers together with professional personnel needed in the industry is presented in Table 18. The profile was constructed from the results of a mail survey conducted (see details in Appendix 15) and information obtained from other sources. The major types of skills needed are plant managers, engineers, foremen, assemblers, welders, machinists, sheet metal workers, painters, setup men, and other non-skilled supporting workers.

Table 18

AVAILABILITY BY LOCATION IN SOUTHWEST GEORGIA OF OCCUPATIONS REQUIRED BY THE FOOD PRODUCTS MACHINERY INDUSTRY, 1977

Required Occupation	Albany	Bainbridge	Thomasville	Moultrie
1. Managers and administrators	P	P	P	P
2. Engineers	P	P	P	P
3. Engineering technicians	P	P	P	P
4. Salesmen and clerks	P	P	P	P
5. Secretaries, bookkeepers, and accountants	P	P	P	P
6. Foremen	P	P	P	P
7. Machine operators	P	P	P	P
8. Precision machine operators	P	P	P	P
9. Machinists	P	P	P	P
10. Mechanics and repairmen	P	P	P	P
11. Tool and die makers	A	A	P	P
12. Setup men	P	P	P	P
13. Welders and flame cutters	P	P	P	P
14. Punch and stamping pressers	P	P	P	P
15. Metal platers	P	P	P	P
16. Miscellaneous operators	P	P	P	P
17. Filers, sanders, polishers, or buffers	P	P	P	P
18. Assemblers	P	P	P	P
19. Checkers and inspectors	P	P	P	P
20. Packers and wrappers	P	P	P	P
21. Shipping and receiving clerks	P	P	P	P
22. Winding operators	P	P	P	P
23. Forklift operators	P	P	P	P
24. Cleaning-service workers	P	P	P	P

P = Workers are present.

A = Workers are absent.

Source: Southwest Georgia Planning and Development Commission, Camilla, Georgia.

In order to investigate the availability of these labor requirements in Southwest Georgia, four locations were examined -- Albany, Bainbridge, Thomasville, and Moultrie -- all representing larger cities in the area. Of the 24 occupational categories necessary for the food products machinery manufacture, all but one were available in the four locations. (See Table 18.) Tool and die makers were not found in Albany and Bainbridge, but were available in Thomasville and Moultrie. In Table 18, "P" shows what workers are present in a particular location, while "A" indicates their absence from that location. The details are given in the table.

Recruitable labor in the four locations is presented in Table 19. The recruitable labor force was estimated by taking the number of unemployed persons in the county of each of the four cities and adding 10% of the civilian employment in that county as of November 1977. Certainly, the unemployment rate of a given county varies from time to time. However, such a figure does provide some indication of recruitable labor. The recruitable labor force can be increased several times if the area of recruiting is expanded to include neighboring counties. For a medium-sized food products machinery plant with employment under 150, the potential labor in each county is sufficient for that purpose. Detailed data on civilian employment and potential labor force in the four-county area is given in Table 19.

Table 19

RECRUITABLE LABOR AT FOUR SOUTHWEST GEORGIA LOCATIONS, NOVEMBER 1977

Location	Civilian Employment	Unemployed	Potential Labor Force
Albany (Dougherty)	34,217	3,148	6,670
Bainbridge (Decatur)	10,725	510	1,580
Thomasville (Thomas)	14,836	670	2,110
Moultrie (Colquitt)	13,230	790	2,150

Source: Georgia Department of Labor, Atlanta.

Wage Rates, Labor Productivity, and Dependability

The Georgia labor force offers a beneficial combination to manufacturing industries -- low wage rates and high labor productivity and dependability.

Labor statistics compiled by both public and private agencies have clearly illustrated this fact. Average hourly earnings, labor productivity, and working time lost in 15 selected states are presented in Table 20. In 1976, average hourly earnings in Georgia were $4.74, 20% to 40% lower than the northern industrial states and the neighboring states of Alabama and Tennessee. Compared with Florida and the Carolinas, Georgia's rate was still lower.

Table 20

AVERAGE HOURLY EARNINGS, LABOR PRODUCTIVITY, AND WORKING TIME LOST IN SELECTED STATES, 1972-1976

State	Average Hourly Earnings (1976)	Labor Productivity (1975)[1/]	Average Percent of Working Time Lost (1972-1976)
Alabama	$5.78	$3.65	0.22
California	6.11	3.33	0.16
Florida	5.29	3.72	0.08
GEORGIA	4.74	4.71	0.06
Illinois	6.06	4.27	0.21
Indiana	6.28	4.00	0.25
Massachusetts	5.61	2.98	0.13
Michigan	6.55	3.46	0.25
New Jersey	6.19	3.60	0.16
New York	5.62	3.79	0.14
North Carolina	4.85	4.07	0.05
Ohio	5.85	3.96	0.31
Pennsylvania	5.73	3.86	0.27
South Carolina	5.31	2.65	0.03
Tennessee	5.80	2.74	0.20

1/ Labor productivity, as used here, is an economic term that gives the value added per dollar of total payroll cost.

Source: "Plant Sites, 1978," Chemical Week, December 14, 1977, p. 51.

Georgia's labor productivity, as measured by the value added per dollar of total payroll cost, has been among the highest in the nation. In 1975, Georgia's labor productivity of $4.71 compared favorably with Indiana's $4.00,

Pennsylvania's $3.86, Florida's $3.72, and South Carolina's $2.65. The detailed productivity rates by state are given in Table 20.

Between 1972 and 1976, the working time lost was only .06% in Georgia, compared with Alabama's .22%, Indiana's .25%, Pennsylvania's .27%, and Tennessee's .20%. (See Table 20.)

The dependability found in the Georgia labor force may be attributed to the right-to-work law passed by the Georgia Legislature in 1947. The Georgia right-to-work law follows:

> Sec. 54-804 Compelling persons to join, or refrain from joining, labor organization, or to strike or refrain from striking.
>
> It shall be unlawful for any person, acting alone or in concert with one or more other persons to compel or attempt to compel any person to join or refrain from joining any labor organization, or to strike or refrain from striking against his will, by any threatened or actual interferences with his person, immediate family, or physical property, or by any threatened or actual interference with the pursuit of lawful employment by such person, or by his immediate family.1/

Hourly earnings in Southwest Georgia are generally lower than average statewide earnings, which are affected by high wages in the Atlanta Metropolitan Area. The hourly earnings of 21 categories of manufacturing workers in Southwest Georgia in 1977 are given in Table 21. The table consists of job code, job title, number of workers in each category, and minimum, maximum, and average hourly earnings. Job titles in the table relate mostly to metal and machinery workers. These hourly earnings are substantially lower than the hourly earnings of northern industrial states in comparable job titles. The information provides a guide to manufacturing wages in Southwest Georgia.

Availability of Material and Supply Requirements

Depending upon the specific product line, the supply and material requirements associated with the food products machinery manufacture can be quite complex. The 59 food products machinery manufacturers who responded to a survey conducted for this study provided some insights into the materials and outside supportive services needed for different products. The materials purchased are

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1/ Acts of 1947, pp. 620, 621. Georgia Code Annotated, Sec. 54-804, Harrison Company, Atlanta.

Table 21

HOURLY EARNINGS OF MANUFACTURING WORKERS IN SOUTHWEST GEORGIA, SEPTEMBER 1977

Code	Job Title	No. of Workers	Hourly Earnings		
			Minimum	Maximum	Average
005	Assembler, Machinery	62	$2.70	$4.55	$3.78
115	Die Press Operator	7	2.80	5.59	4.36
182	Drill Press Setup Operator	31	2.30	3.55	2.91
225	Fourdrinier Machine Tender	12	8.73	9.36	9.15
246	Inspector, Line	53	2.30	5.27	3.12
247	Inspector, Quality Control	118	2.30	5.51	4.14
265	Laborer, General	31	2.30	3.82	3.24
266	Lathe Operator	16	3.90	6.10	4.41
267	Layout Man, Metal	4	4.05	6.10	4.59
275	Machine Fixer	53	2.68	5.70	4.56
281	Machinist I	35	2.30	6.10	4.81
283	Maintenance Mechanic II	145	2.90	8.35	6.10
294	Finisher, Metal	22	2.40	4.38	3.83
313	Packager, Machine	448	2.30	6.47	5.81
319	Painter, Spray I	37	2.40	4.55	3.73
339	Presser, Machine	57	2.30	3.86	3.01
347	Punch Press Operator	145	2.30	4.55	3.46
366	Roving Frame Tender	7	3.80	4.18	4.06
393	Sheet Metal Worker	21	3.00	6.10	3.91
464	Tool and Die Maker, Metal	6	4.50	6.15	5.26
515	Welder, Arc	95	3.20	6.10	4.02

Source: Georgia Manufacturing Wage Rates, Georgia Department of Industry and Trade, Atlanta, September 1977.

listed in Appendix 16, and the outside supportive services required are presented in Appendix 17. A summary of these required materials and services is given below.

Materials purchased:

- Structural steel
- Stainless steel sheet
- Steel bars
- Angles
- Tubings
- Pipes
- Electrical components
- Machinery parts
- Motors
- Pumps
- Chains
- Bearings
- Cylinders
- Conveyors
- Gears
- Plastic plates
- Plastic belts
- Rubber products
- Tape adhesives
- Printing inks
- Wax coatings
- Glue and resin
- Paints
- Fiberglass tanks
- Aluminum
- Brass
- Bronze
- Linerboard
- Lumber
- Corrugated boxes
- Sand
- Soda Ash
- Limestone

Supportive services required:

- Stamping
- Molding
- Forging
- Plating
- Coating
- Casting
- Extruding
- Foundry
- Welding
- Forming
- Galvanizing
- Laminating
- Machine shops
- Construction contractors

Nearly all of these materials and services can be obtained in Georgia or in the neighboring states. The seven southeastern states produce a substantial amount of steel and steel products. In the seven southeastern states, there were 66 primary steel furnaces, 9 intermediate steel plants, 51 finishing steel mills, and 35 steel fabricating plants in 1974. Details concerning these mills and their capacities are given in Appendix 20.

However, most food products machinery manufacturers purchase their steel materials from metal service centers, rather than directly from steel mills. According to the Dun and Bradstreet Metalworking Directory, the number of metal service centers, machinery job shops, foundries, castings, forgings, stampings, etc., in Alabama, Florida, and Georgia are presented in Table 22. In this table, standard industrial classification (SIC), service or product, and the number of establishments under each SIC in respective states are given. The approximate locations of these establishments in each state are delineated in Maps 4 to 10. The large number of metal service centers, job shops, and other services offered in the three-state area would assure the availability of metal products and services to any food products machinery plant locating in Southwest Georgia.

Table 22

NUMBER OF METAL SERVICE ESTABLISHMENTS IN ALABAMA, GEORGIA, AND FLORIDA, 1977

SIC	Service or Product	Alabama	Georgia	Florida
3321	Gray Iron Foundries	37	11	5
3322	Malleable Iron Foundries	5	1	1
3324	Steel Investment Foundries	2	0	1
3325	Steel Foundries, N.E.C.	6	5	4
3361	Aluminum Castings	15	9	11
3362	Brass, Bronze, and Copper Castings	6	2	8
3369	Nonferrous Castings, N.E.C.	2	-	7
3462	Iron and Steel Forgings	6	-	3
3463	Nonferrous Forgings	1	-	-
3465	Automotive Stampings	1	2	2
3469	Metal Stampings, N.E.C.	21	19	22
3471	Electroplating, Polishing, Anodizing, etc.	11	7	16
3479	Coating, Engraving, etc.	14	2	6
3599	Job Shops (Machinery, except Electrical)	54	44	63
5051	Metal Service Centers	34	50	56

Source: Dun and Bradstreet Metalworking Directory, 1977, Dun & Bradstreet, Inc., New York.

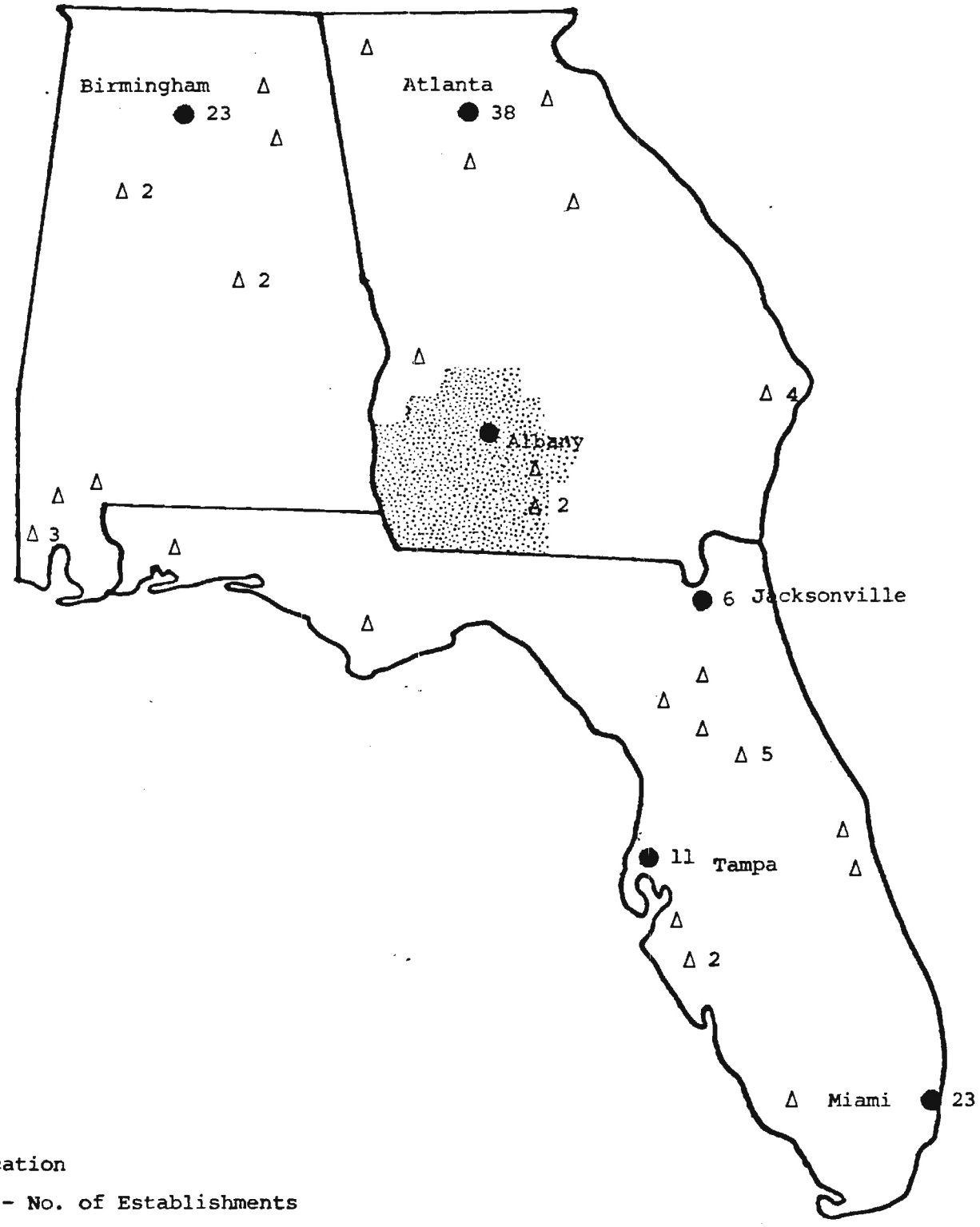
Georgia and the neighboring states are the major producers of lumber and paper products as well as fabrics. The costs of packaging materials such as wooden pallets, crates, cartons, etc., are substantially lower in this area than in the North or West.

Prices of steel products are comparable between southern locations and northern locations. Southern steel mills produce nearly all steel materials used by food products machinery manufacturers, except stainless steel. Because of imports, however, prices of stainless steel in many instances are lower in the South than in the North.

Atlanta is the distribution center of the Southeast. Over two thirds of the nation's top 500 companies have a sales office or distribution facility in

Map 4

DISTRIBUTION OF METAL SERVICE CENTERS IN ALABAMA, FLORIDA, AND GEORGIA

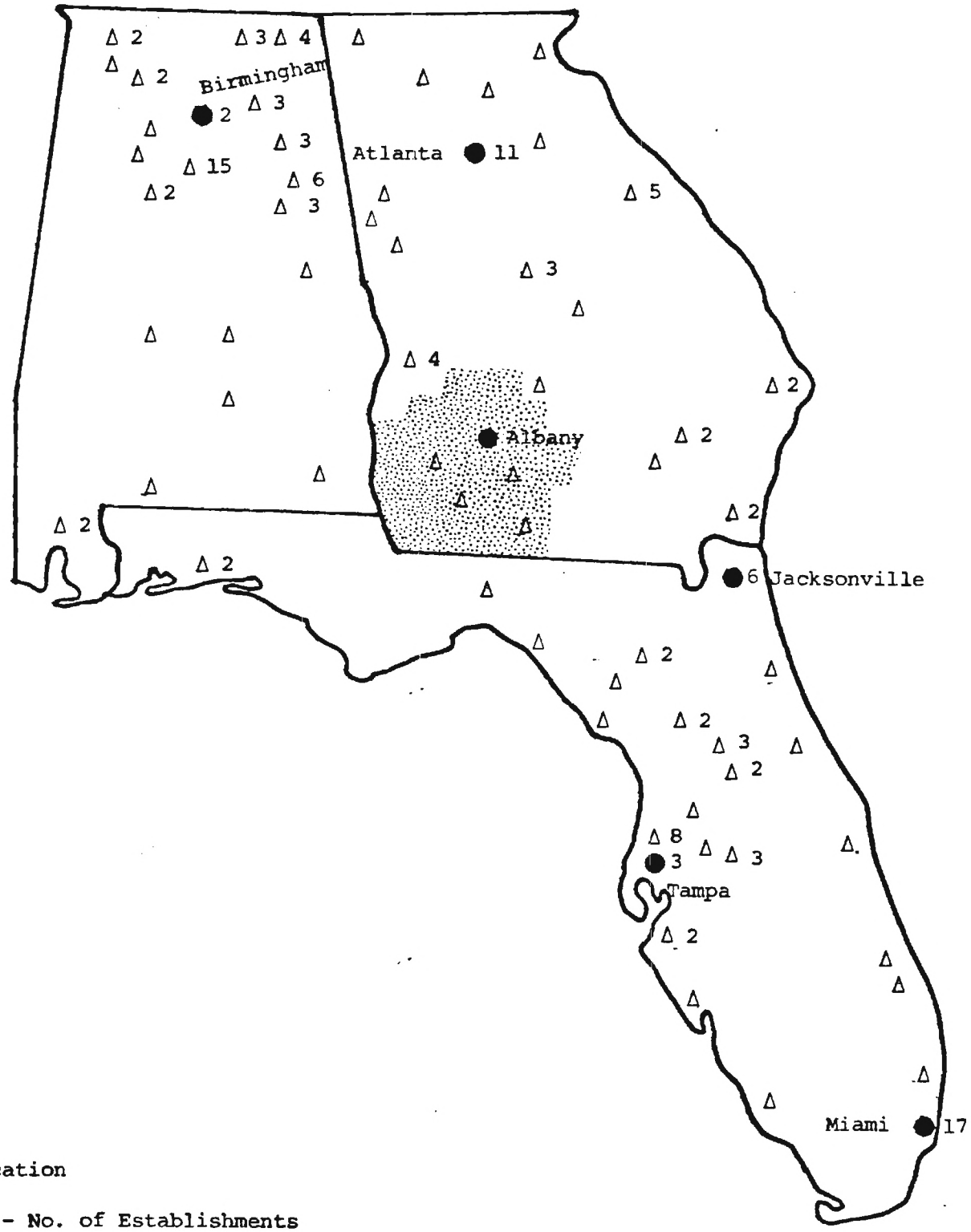


Δ - Location

Number - No. of Establishments

Map 5

DISTRIBUTION OF JOB SHOPS IN ALABAMA, FLORIDA, AND GEORGIA

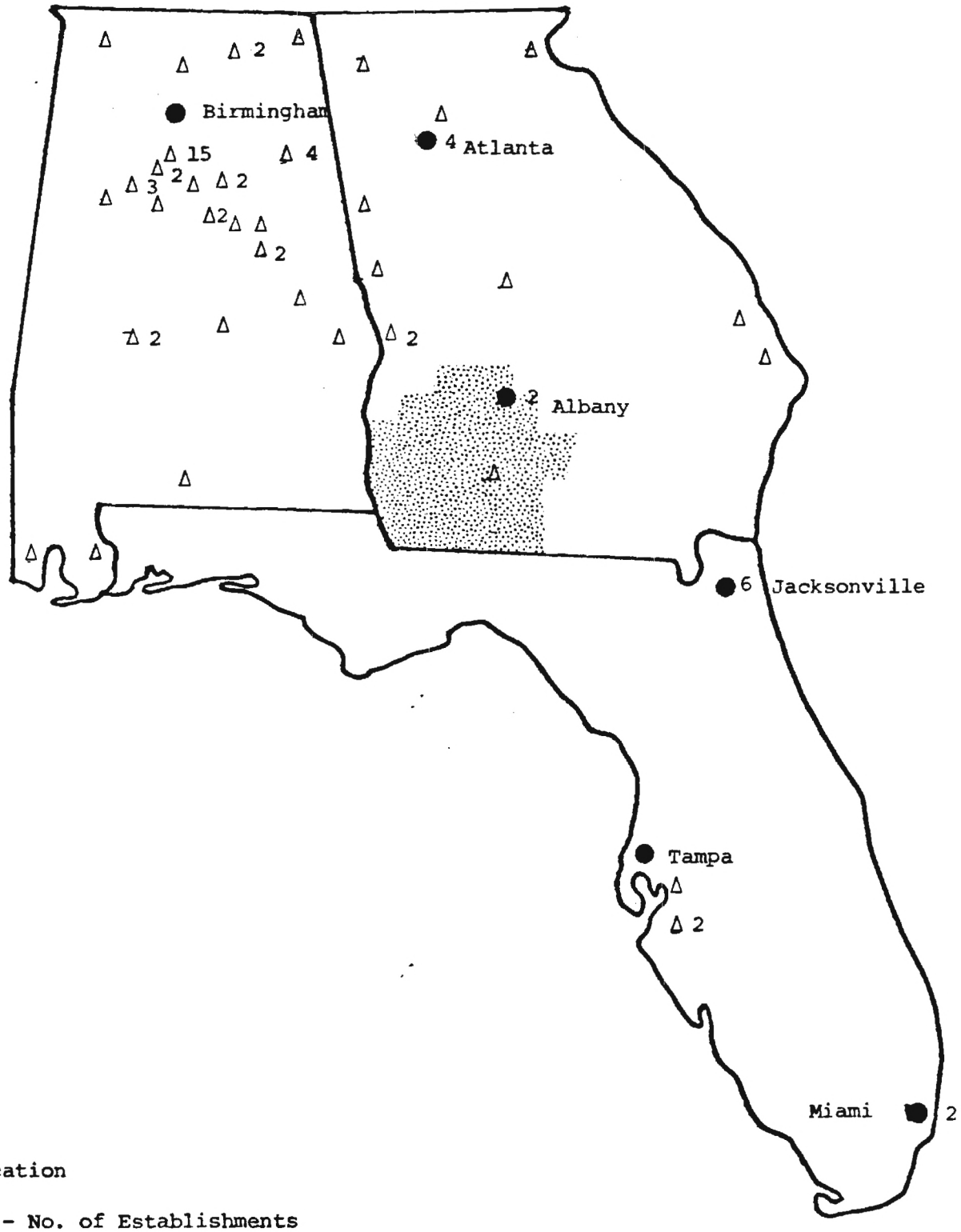


Δ - Location

Number - No. of Establishments

Map 6

DISTRIBUTION OF IRON AND STEEL CASTINGS SERVICES
IN ALABAMA, FLORIDA, AND GEORGIA

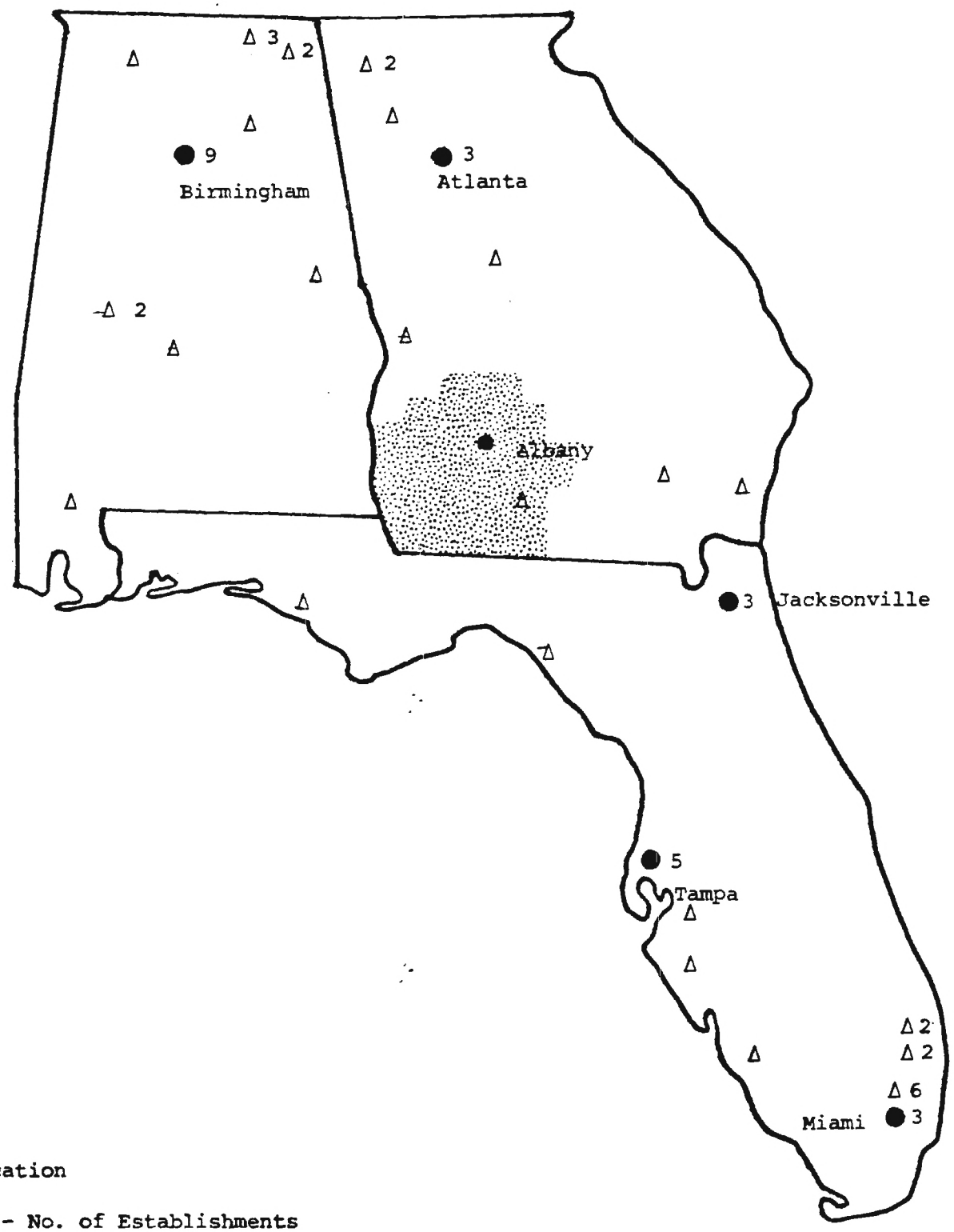


Δ - Location

Number - No. of Establishments

Map 7

DISTRIBUTION OF NONFERROUS CASTING SERVICES
IN ALABAMA, FLORIDA, AND GEORGIA

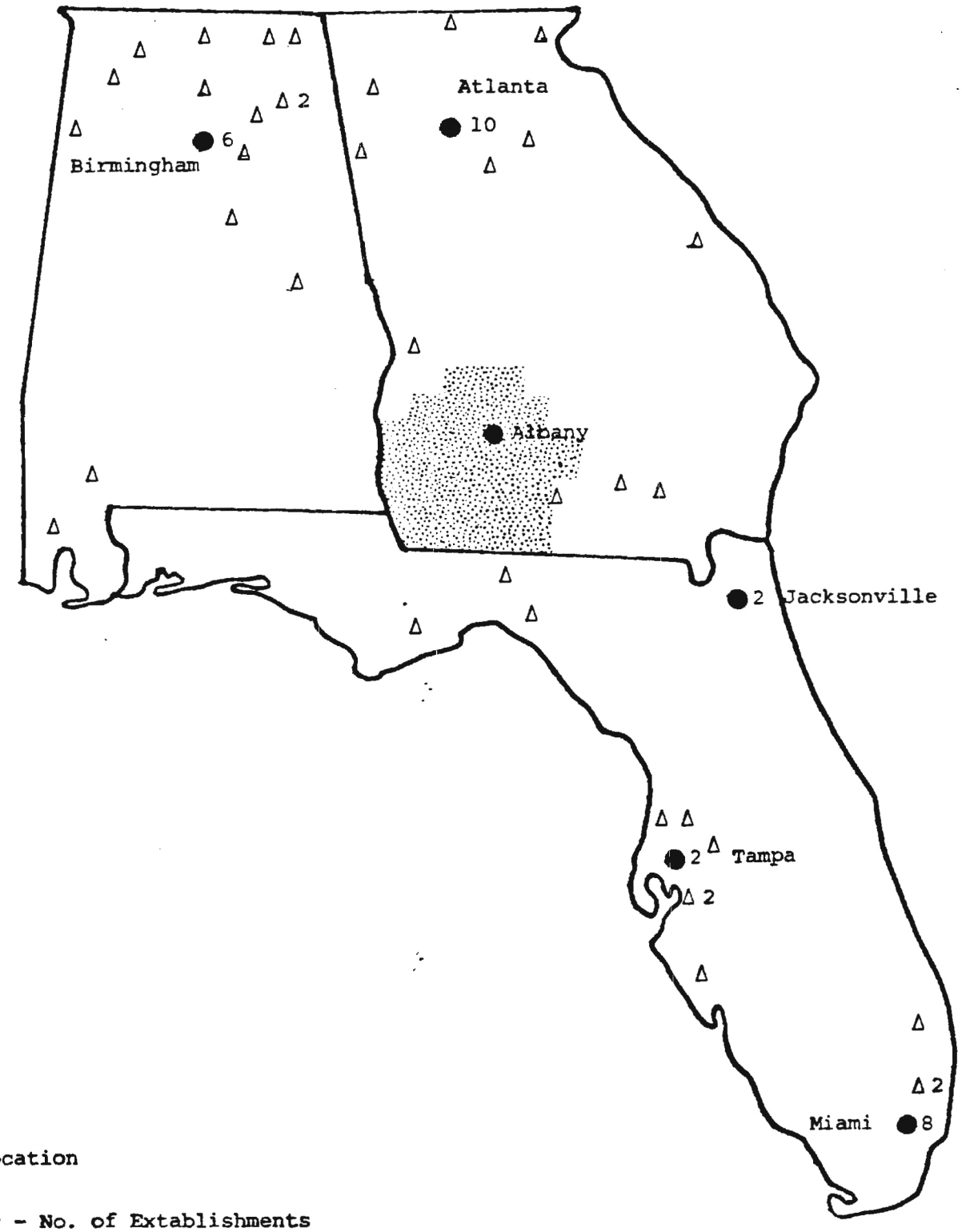


Δ - Location

Number - No. of Establishments

Map 8

DISTRIBUTION OF STAMPING SERVICES IN ALABAMA, FLORIDA, AND GEORGIA

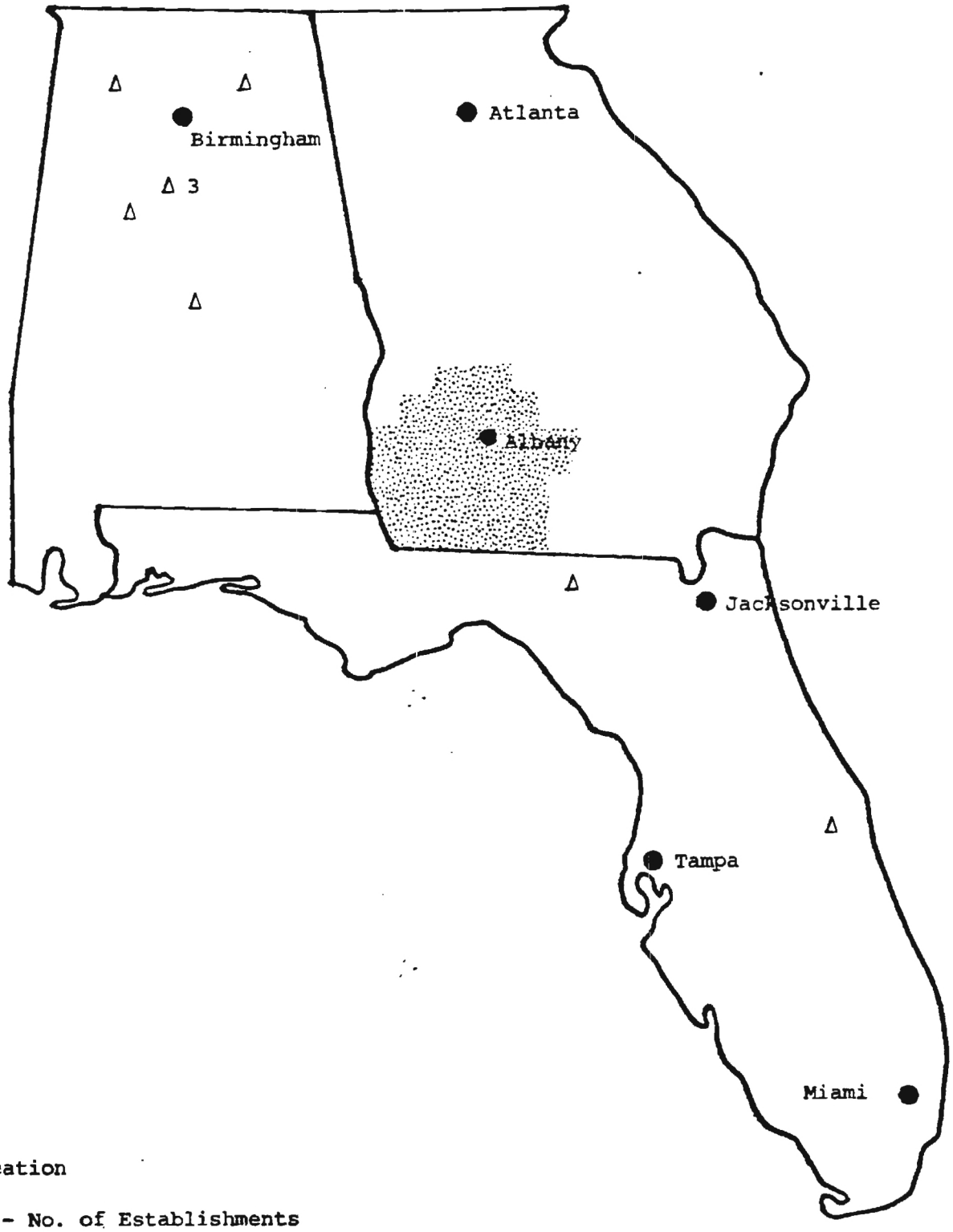


Δ - Location

Number - No. of Extablishments

Map 9

DISTRIBUTION OF FORGING SERVICES IN ALABAMA, FLORIDA, AND GEORGIA

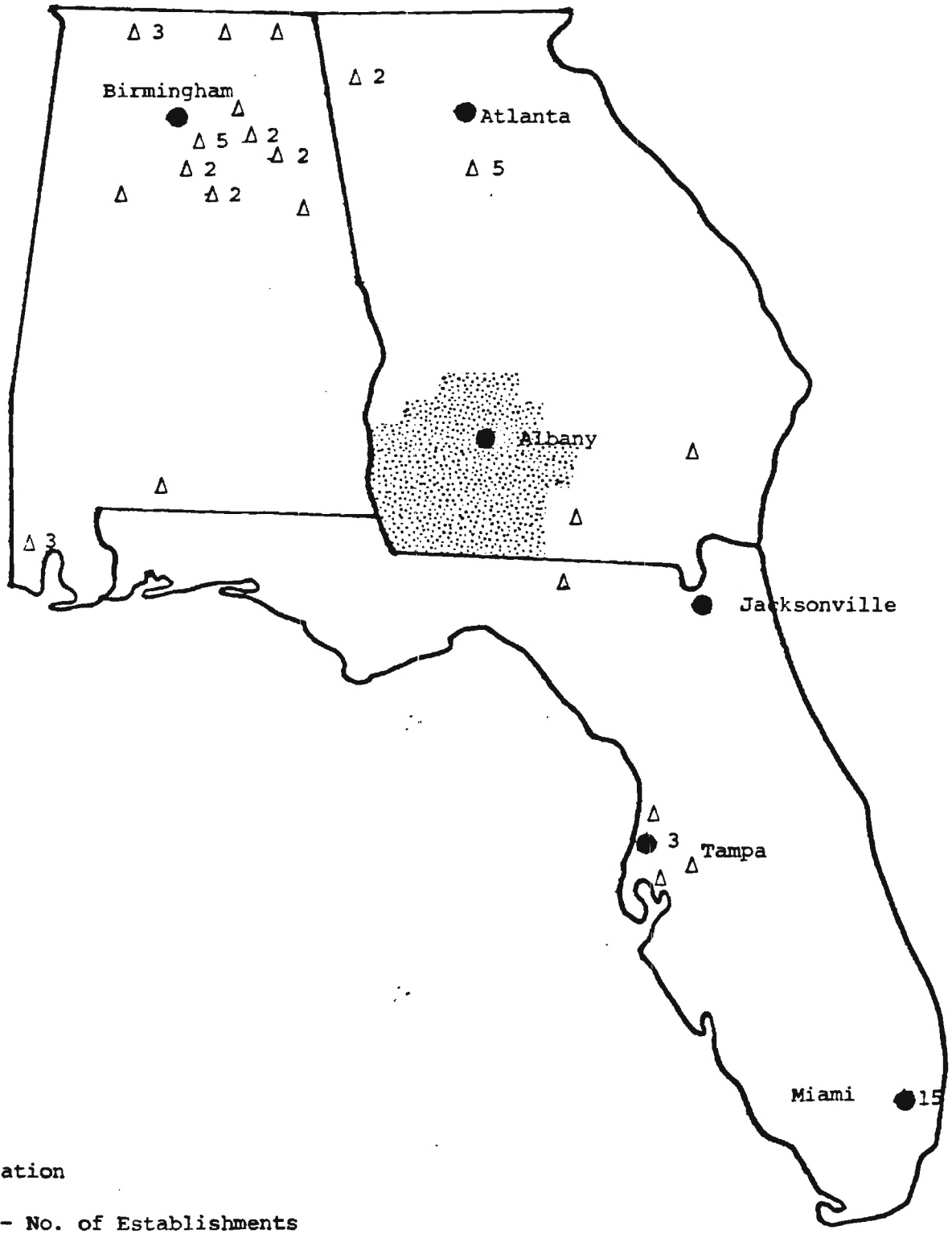


Δ - Location

Number - No. of Establishments

Map 10

DISTRIBUTION OF ELECTROPLATING, POLISHING, ANODIZING, COATING, AND ENGRAVING SERVICES IN ALABAMA, FLORIDA, AND GEORGIA



Δ - Location

Number - No. of Establishments

the metropolitan area. Machinery parts and electrical components are easily obtainable here.

Availability of Transportation Requirements

Most food products machinery manufacturers serve regional, national, or even international markets. Consequently, the availability of transportation facilities becomes an important factor to be considered in the location of a food products machinery plant. Based on a mail survey conducted for this study, trucks are the primary transportation used for shipments of materials and goods by the food products machinery industry. Rail provides a secondary service, while air transportation is rarely used. Of the 59 respondents to the survey, 54 used truck, 14 used rail, and only two used air transportation. Further information on transportation modes used by the survey respondents is given in Appendix 18.

The distance for both inbound and outbound shipments indicates somewhat the market area of the food products machinery manufacturer. Shipments of less than 1,000 miles were received by 30 out of 34 survey respondents, which indicates that material supplies are obtained mostly from regional sources. Eighteen of 34 replied that their shipments to customers traveled less than 1,000 miles. It appears that a majority of food products machinery manufacturers are active within a 1,000-mile radius, or a regional market. Shipments beyond 1,500 miles to 2,000 miles serve a national or international market. Additional details on shipment distances by survey respondents are found in Appendix 19.

Two other kinds of service are important to the food products machinery industry -- air transportation and parcel delivery and pickup service. Air transportation is important for executives and sales personnel on business trips. Atlanta, the hub of air transportation in the South, has national connections. Most of the Southwest Georgia locations have their own commercial air service. Parcel delivery and pickup service is important to the food products machinery manufacturer because of the need for fast delivery service on small quantity/volume of materials purchased or goods sold. The United Parcel Service (UPS), as well as bus lines and airlines in most Southwest Georgia locations, provides parcel delivery and pickup service.

Highway, rail, bus, truck, water, and air transportation facilities in Albany, Bainbridge, Thomasville, and Moultrie are outlined in Table 23. The

Table 23

TRANSPORTATION FACILITIES AT FOUR MAJOR LOCATIONS IN SOUTHWEST GEORGIA

Type of Transportation Facilities	Albany	Bainbridge	Thomasville	Moultrie
(1) Highways				
Federal (Highway No.)	19, 82	27, 84	19, 84, 319	319
State (Highway No.)	3, 91, 133, 234, 257	97, 253, 309, 311, 312	122, 202	33, 37, 111, 133
Distanct to Nearest Interstate	41 miles (I-75)	78 miles (I-75)	33 miles (I-75)	22 miles (I-75)
(2) Rail				
Lines Serving	Seaboard Coast Line Southern Railway System	Seaboard Coast Line	Seaboard Coast Line	Seaboard Coast Line Southern Railway
Piggyback Service	Yes	Yes	Yes	Yes
(3) Bus				
Line Serving	Trailways	Trailways	Trailways	Trailways
(4) Truck				
No. of Motor Freight Carriers				
Interstate	19	9	10	15
Intrastate	4	2	2	3
Local Terminals	16	3	3	1
(5) Water				
Navigable River	Flint River at Bainbridge	Flint River	Flint River	Flint River
Distance	60 miles	Local	35 miles	52 miles
Nearest Seaport	Brunswick, Ga.	St. Joe, Fla.	St. Joe, Fla.	Brunswick, Ga.
Distance	172 miles	100 miles	150 miles	148 miles
(6) Air				
Nearest Commercial Air Service	Albany - 4 miles	Tallahassee, Fla. - 38 miles	Moultrie - 19 miles	Moultrie - 7 miles
Name of Airline Serving	Southern Airways	Eastern, National	Southern Airways	Southern Airways

Source: Economic Development Profile, Georgia Department of Community Development, Atlanta.

facilities of these four Southwest Georgia locations are given only as representatives of the area. Many other Southwest Georgia locations are equally as desirable, but constraints on the length of this report prohibit their inclusion here. Very good truck and rail service is available because of the number of rail, bus, and trucklines serving the area. Map 1 illustrates the transportation system in the Southwest Georgia area.

Availability of Power and Fuel Requirements

During the last two winters at the height of power and fuel shortages throughout the northern industrial belt, all manufacturing plants in Southwest Georgia operated normally without the adverse effects of bad weather or power and fuel shortages. Generally, power and fuel supplies are not an overriding concern to most food products machinery manufacturers (under normal conditions), because their requirements are not too large on the average. Electrical power, the most important utility need of the food products machinery manufacturer, is supplied by the Georgia Power Company, with sufficient capacity to take care of any new manufacturing in the foreseeable future. Gas is used largely for heating purposes in food products machinery plants. Because of Southwest Georgia's year-round gentle climate, the requirement for gas in manufacturing would be minimal. However, the supply is there if needed. Oil is required by only a small percentage of food products machinery plants; a supply of fuel oil does exist in Southwest Georgia.

Accessibility to Markets

Accessibility to markets depends upon two elements -- (1) the distance to markets plus the availability of a transportation system and (2) relative production costs. As shipping distances increase, transportation costs rise in most instances. However, production costs can influence the decision to reach a distant market because lowered production costs can more than offset higher transportation costs. Manufacturers have become less concerned with distance to markets and more interested in the result of the total economic situation at a given plant site.

The shifting of market patterns and the relative costs of transportation to product value are two distinct advantages favoring Southwest Georgia. It has been clearly shown in the previous sections that the growth markets for food and kindred products and food products machinery have changed gradually

from the North to the South because of the shifting patterns of population distribution and other economic conditions. The market is thus moving closer to southern manufacturers. The high product value of food products machinery relative to transportation costs is another important factor to be considered. As discussed earlier in this report, most food products machinery manufacturers have shipped their products on a nationwide basis or to a large regional market, proving that transportation costs alone will not deter reaching distant markets.

The diversity of product designs in food products machinery is great, making it easier to market a product nationally because of the distinctive features that would appeal to a variety of end users.

A simple freight cost analysis, disregarding production costs and product design, is provided in Map 11. The analysis shows a freight break-even line for three hypothetical plants shipping cooling or freezing pasteurizers to 20 major markets in the United States. The three starting points are Albany, Georgia; Chicago, Illinois; and Orlando, Florida. Rates are computed on per hundredweight of the commodities on a truckload basis. These rates, together with starting and ending points, are given in Table 24.

Albany has a clear freight advantage over Chicago and Orlando in all southern states (except Florida) plus the New York-Philadelphia area. In the New England, mid-western, and western states, Chicago possesses distinct advantages in freight costs, leaving a narrow corridor in Florida as the area most favorable for Orlando. (See Map 11.) Readers need to be reminded again that freight costs alone will not be a decisive factor in determining a valid marketing plan. Savings in production costs and other expenses could easily put a food products machinery manufacturer in Southwest Georgia in a strong position to market his products nationally. The next chapter will provide an objective case study on investment requirements and production costs for a model production.

Potential Plant Sites

Most locations in Southwest Georgia have developed their industrial district or industrial park with roads, rail connections, and utilities. Privately developed and undeveloped land are excluded in this report. Albany, Bainbridge, Thomasville, and Moultrie in the area are used again for illustration purposes. Only very brief information on each industrial park is offered here; detailed information may be obtained by contacting local development authorities, the

Map 11

FREIGHT BREAK-EVEN LINES FOR ALBANY, GA.; CHICAGO, ILL.; AND ORLANDO, FLA.;
FOR SHIPMENTS OF FOOD PRODUCTS MACHINERY, 1978

Southwest Georgia Planning and Development Commission, Camilla, Georgia, or the Georgia Department of Industry and Trade, Atlanta.

Table 24

MOTOR FREIGHT RATES FOR COOLING OR FREEZING APPARATUS IN THE UNITED STATES, 1978[1/]
(in cents per hundredweight)

To	From		
	Albany, GA	Chicago, IL	Orlando, FL
Birmingham, AL	191	344	281
Wilmington, DE	412	419	438
Tampa, FL	212	490	119
Atlanta, GA	125	371	259
Chicago, IL	414	-	490
Indianapolis, IN	371	172	446
New Orleans, LA	259	414	327
Baltimore, MD	396	407	416
Detroit, MI	421	209	490
Jackson, MS	241	366	327
Omaha, NE	485	309	567
Greensboro, NC	265	395	302
New York, NY	438	442	461
Columbus, OH	381	212	451
Oklahoma City, OK	445	417	528
Philadelphia, PA	412	419	438
Greenville, SC	217	389	278
Memphis, TN	259	299	349
Dallas, TX	408	456	484
Milwaukee, WI	432	132	508

1/ Rates per hundredweight on Cooling or Freezing Apparatus combined, per Item 53300, National Motor Freight Classification 100-D - Truckload Class 55.

Source: Georgia Freight Bureau, Inc., Atlanta, Georgia, January 20, 1978.

A selected list of industrial parks in Southwest Gerogia is given below:

(1) ALBANY SOUTHERN INDUSTRIAL DISTRICT, Albany, Georgia

Location: At West Albany, Georgia, south and adjacent to the city limits

Total acres in site: 550

Total available acres: 315

Utilities: Electricity, gas, sewer, water, and fire protection

Transportation: Roads and rail connections

Owner: Southern Railway System

Contact: James C. Cook, Manager
Industrial Properties
Southern Railway System
99 Spring St., S. W., Room 804
Atlanta, Ga. 30303
Phone: (404) 688-0800

(2) ALBANY INDUSTRIAL PARK, Albany, Georgia

Location: Adjacent to south city limits of Albany

Total acres in site: 85

Total available acres: 85

Utilities: Electricity, gas, sewer, water, and fire protection

Transportation: Roads and rail connections

Owner: Seaboard Coast Line Railroad

Contact: J. Ross Le Grand
Seaboard Coast Line Railroad
500 Water St., Room 926
Jacksonville, Fla. 32202
Phone: (904) 353-2011

(3) DECATUR COUNTY INDUSTRIAL AIR PARK, Bainbridge, Georgia

Location: 5 miles northwest of Bainbridge on U. S. 27

Total acres in site: 500

Total available acres: 300

Utilities: Electricity, gas, sewer, water, and fire protection

Transportation: Roads and rail connections

Owner: Decatur County

Contact: Thomas A. Larson, Executive Director
Bainbridge-Decatur County Chamber of Commerce
P. O. Box 736, Bainbridge, Ga. 31717
Phone: (912) 246-4774

(4) ROSE CITY INDUSTRIAL DISTRICT, Thomasville, Georgia

Location: Industrial Boulevard, Thomasville, Georgia

Total acres in site: 217

Total available acres: 105

Utilities: Electricity, gas, sewer, water, and fire protection

Transportation: Roads and rail connections

Owner: City of Thomasville

Contact: Lloyd E. Eckberg, Executive Vice President
Thomasville-Thomas County Chamber of Commerce
P. O. Box 560, Thomasville, Ga. 31792
Phone: (912) 226-1131

(5) GATEWAY COMMERCIAL PARK, Thomasville, Georgia

Location: Corner of U. S. 19 and U. S. 319, within the city limits

Total acres in site: 150

Total available acres: 74

Utilities: Electricity, gas, sewer, water, and fire protection

Transportation: Roads and rail connections

Owner: McKinnon Realty Co., Thomasville, Ga. 31792

Contact: Lloyd E. Eckberg, Executive Vice President
Thomasville-Thomas County Chamber of Commerce
P. O. Box 560
Thomasville, Ga. 31792
Phone: (912) 226-1131

(6) MOULTRIE-COLQUITT COUNTY INDUSTRIAL PARK, Moultrie, Georgia

Location: Moultrie-Lenox Post Road

Total acres in site: 435

Total available acres: 118

Utilities: Electricity, gas, sewer, water, and fire protection

Transportation: Roads and rail connections

Contact: George A. Hanson
Moultrie Chamber of Commerce
P. O. Box 487
Moultrie, Ga. 31768
Phone: (912) 985-2131

Industrial Financing Assistance and Employee Training Programs

One of Georgia's strong points in attracting new industries is the industrial financing assistance and employee training programs available. Packages of financial support to new industries are available through the various development agencies. Depending on the needs of the particular company, the

development agency staff can put together appropriate financial packages. Some notable financial support programs operating in the state are described below:

- o Industrial Revenue Bonds
  Available throughout the state to qualified companies, revenue bonds have a 1% to 2% interest advantage over conventional loans. Used primarily by manufacturers, they allow 100% financing of buildings, land, equipment, and financing costs. A $5 million limit exists on revenue bonds for any one project, except for pollution control issues which have no limit. In recent years, industrial revenue bonds issued in the state exceeded $100 million annually.

- o Business Development Corporation
  The Georgia Business Development Corporation is a private, state-chartered corporation whose membership includes banks, savings and loan associations, utilities, and insurance companies. Used primarily by manufacturers unable to obtain conventional financing, Business Development Corporation loans range from $50,000 to $250,000 for time periods up to 15 years.

- o Local Development Corporations
  Established as private corporations by local business leaders, over 200 local development corporations throughout Georgia provide local and Small Business Administration 502 loan funding for qualified manufacturers.

- o Federal Lending Agencies
  Three federal agencies have business loan programs in the state -- Small Business Administration, Farmers Home Administration, and Economic Development Administration.

- o International Banks
  New state law permitting international banking activities has led to Atlanta offices for Barclays Bank and Swiss Creditbank, with others expected to follow.

The unchallenged financial center of the Southeast, Atlanta boasts three of the nation's top 100 banks, and the Federal Reserve Bank's Sixth District headquarters.

Georgia has a number of productive sources for business financing. The two most valuable sources probably are industrial revenue bonds and loans from the Georgia Business Development Corporation.

Georgia offers without charge to new and expanding companies, an exceptional employee training program -- Quick Start. A summary of the Quick Start program follows:

- o Consultation and Analysis

  When a company selects a Georgia plant site, an industrial training team visits the home plant to consult with key company officials. Together they determine the company's manpower needs, job requirements, and start-up schedule.

- o The Training Plan

  Georgia's training coordinators then design a training plan for the company's approval. The plan spells out each course's content, goals, start and completion dates, location, and methods for recruiting and selecting trainees.

- o Training Facilities and Equipment

  Training facilities are set up in the area vo-tech school, or if more convenient to the plant site, in special facilities rented by the State of Georgia. All facilities are equipped with production machinery comparable to the company's. Quick Start programs can draw on over $25 million in equipment holdings from Georgia's 32 area vo-tech schools. Many Quick Start programs use both state and company equipment.

- o Instruction

  Georgia selects and pays competent, qualified instructors to conduct training classes. In most cases, company personnel are borrowed to teach highly specialized skills.

- o Trainees

  Local offices of the Georgia Department of Labor and the area vo-tech school recruit, test, and screen prospective employees in accordance with company specifications. Trainees attend training sessions on their own time, without any training allowance or other compensation.

Four vocational-technical schools are located in Southwest Georgia. The locations, enrollments, and number of graduates of these four schools are given in Table 25.

Table 25

ENROLLMENT AND GRADUATES OF FOUR VOCATIONAL-TECHNICAL SCHOOLS IN SOUTHWEST GEORGIA, 1975-1976

Location	Enrollment[1/]		Graduates	
	Day	Evening	Day	Evening
Albany	1,337	2,914	353	1,912
Moultrie	512	1,964	282	699
Thomasville	877	1,991	247	1,612
Bainbridge	55	218	23	177

1/ Unduplicated cumulative enrollment.

Source: Southwest Georgia Planning and Development Commission.

A MODEL PRODUCTION

This chapter analyzes the feasibility of locating a food processing machinery manufacturing company in either Chicago, Illinois, or Albany, Georgia. To analyze the expected total capital expenditures and production costs for each location, a model company was designed to manufacture a wide variety of machinery necessary to the food processing industry.

Assumptions

After analyzing the entire food processing machinery market, a decision was made to analyze the model company at each location while assuming the manufacture of two product lines, pasteurizer/cooler and spin cooler. These two items were chosen because of their expected demand in future years. Preliminary market analysis indicated a very strong demand for these two items; however, it was evident that annual sales of these two items alone would not justify the construction of a manufacturing facility. It is estimated that annual sales will approximate 10 pasteurizer/coolers and 10 spin coolers, while optimum plant capacity, at full production, will total 14 pasteurizer/coolers and 18 spin coolers.

It is necessary, therefore, to augment the model plant's production schedule with additional product lines. After reviewing the entire food products machinery field, a list of recommended additional products was developed. The additional products were chosen because their production methods and equipment necessary for production are compatible with those required for the two major products. Any product analyzed that required additional expenditures for manufacturing equipment was automatically omitted. The items considered to hold the most potential as auxiliary products are: (1) blanchers, (2) breading and battering machines, (3) fryers, (4) can and bottle warmers, and (5) various conveyor systems. Market analysis reveals that the sales volume of the auxiliary product lines will easily consume all available production capacity.

Rather than attempt to project total annual sales of the two primary product lines and all auxiliary product lines, it was decided to analyze the model company while assuming full production of only the two primary product lines. For the purpose of projecting the annual production cost for the model plant, it is assumed that the same percentages of total cost (raw materials, labor, utilities required, depreciation, interest, etc.) apply to the auxiliary

product lines as apply to the two primary product lines. Making this assumption, it is possible to calculate the annual production costs for the model plant at the hypothetical full capacity of 14 pasteurizer/coolers and 18 spin coolers.

Both the pasteurizer/cooler and spin cooler are custom designed to handle the individual customer's needs. Pasteurizer/coolers are found in a variety of plants processing food products such as vegetables, juices, jams, fruits, and syrups. The pasteurizer/cooler is a long tunnel with heating and cooling zones through which the containerized food products are conveyed for proper processing. These heating and cooling zones are designed to deliver the appropriate time/temperature combination for the products being processed.

The pasteurizer/cooler used for costing purposes in this study is constructed of stainless steel and is 10 feet wide and 50 feet long. In this particular pasteurizer/cooler the product enters at fill temperature, is heated to a predetermined process temperature, and is held for a given period of time. The product is then continuously cooled to a given temperature, dried, and exited from the machine.

The spin cooler is used when the product needs only to be cooled and dried after being containerized. The containers (cans), filled with the food product being processed, enter the spin cooler at fill temperature. The containers are then continually cooled to a given temperature and exited from the machine. While the containers are being conveyed through the cooling zones of the spin cooler, they are continuously agitated and rotated to prevent stack burn. The spin cooler analyzed in this study is 5 feet wide and 50 feet long and has eight product handling lanes.

The calculations in the following sections are based on the model plant producing only pasteurizer/coolers and spin coolers.

Capital Costs

Capital costs for the model company consists of fixed capital requirements and working capital. Capital costs in each of these categories for plants in two compared locations (Albany and Chicago) are discussed below and summarized in Table 26.

Table 26

TOTAL CAPITAL COSTS FOR MODEL PLANT IN TWO LOCATIONS

	Albany	Chicago
Fixed Capital Requirements	$ 943,106	$1,294,718
Working Capital	465,636	465,636
Total Capital Costs	$1,408,742	$1,760,354

Fixed Capital Requirements. Fixed investment requirements include land, building, production equipment, maintenance equipment, material handling equipment, fire protection equipment, installation and erection, engineering, paving, contingencies, and interest during the construction period. These fixed investment costs are given in Table 27 for the two locations considered for this model plant. The total fixed investment for the two locations are: Albany, $943,106; and Chicago, $1,294,718.

Table 27

FIXED INVESTMENT REQUIREMENTS FOR MODEL PLANT IN TWO LOCATIONS

Item	Albany	Chicago
Land Costs	$ 60,000	$ 220,000
Building Costs	366,897	482,566
Production Equipment	189,169	189,169
Auxiliary Equipment	152,015	160,415
Equipment Installation	4,700	6,016
Engineering Fees	43,140	59,220
Paving (Parking Lot)	8,116	13,689
Contingency	81,894	112,549
Interest during Construction	37,175	51,094
Total	$943,106	$1,294,718

o Land Costs. Land costs are estimated at $15,000 per acre in Albany and $55,000 per acre in Chicago. These costs, supplied by Lawyers Title Insurance Company, were average 1977 actual land transaction prices for fully developed industrial property. Land requirements were estimated on the basis of present

needs and possible future expansion. The optimum site size was calculated to be four acres.

o Building Costs. Building costs for each location are separated into three categories. These categories are for variations in building construction as follows: (1) prefab metal manufacturing facility with 20' clearance, (2) prefab metal manufacturing facility with 40' clearance, and (3) tilt-up concrete office building. The prices for each location are, respectively: Albany - $12.478/ft.^{2}, $16.8864/ft.^{2}, and $15.5184/ft.^{2}; Chicago - $16.4235/ft.^{2}, $22.1988/ft.^{2}, and $20.4228/ft.^{2} These costs are based on "Dodge Building Cost Calculation and Valuation Guide." The costs include structure and finish, electric and lighting, sprinkled production and office areas, loading dock, insulation, heating for production areas, and heating and air conditioning for office area. The actual construction for the building to house this operation consists of: 10,000 ft.^{2} metal prefab with 20' clearance, 12,500 ft.^{2} metal prefab with 40' clearance, and 2,000 ft.^{2} tilt-up office building.

The cost estimates for land and plant building (see Tables 28 and 29) are based on the above data. Albany has the lower total cost of $426,897, with total costs in Chicago calculated at $702,566.

o Production Equipment. The pieces of equipment necessary for manufacturing the products included in this study are housed in five production cost centers or areas. These areas, as shown in Figure 3 (floor layout), are: iron shop, sheet metal shop, machine shop, assembly, and painting/finishing. The production equipment and respective prices to be located in each of these production cost centers are listed in Table 30. The shipping costs for this equipment are negligible; therefore, the prices at the two locations are considered constant. Figure 4 indicates the normal production and material flow recommended for the model plant.

o Auxiliary Equipment for General Operation of Facility. Equipment listed under this category includes general office furniture and equipment, fire protection equipment, and material handling equipment, i.e., forklift, 10-ton overhead crane (installed), and 5-ton overhead crane (installed). The total estimated costs for these items for each location are: Albany, $152,015, and Chicago, $160,415. A detailed breakdown of these costs is included in Table 31.

o Equipment Installation. Installation costs will be required for installing and securing production equipment once it arrives at each destination.

Table 28

INVESTMENT REQUIREMENTS FOR LAND AND BUILDING IN TWO LOCATIONS

Location	Land Cost			Building Cost			Land and Building Cost
	No. of Acres	Cost/Acre ($)	Total Cost ($)	Sq. Ft. Required ($Ft.^2$)	*Cost/$ft.^2$ ($)	Total Cost ($)	Total Cost ($)
Albany	4	15,000	60,000	24,500	14.754	366,897	426,897
Chicago	4	55,000	220,000	24,500	19.6966	482,566	702,565

* This figure represents the weighted average $/ft.^{2} cost for the entire building (production areas and office). See Table 29 for cost/$ft.^2$ for different types of construction.

Table 29

ESTIMATED BUILDING COSTS IN TWO LOCATIONS

Location	Metal Building with 20 ft. Clearance		Metal Building with 40 ft. Clearance		Tilt-Up Slab Construction		Total Cost of Construction of Mfg. Facility
	$/$ft.^2$	Total for 10,000 $ft.^2$	$/$ft.^2$	Total for 12,500 $ft.^2$	$/$ft.^2$	Total for 2,000 $ft.^2$	
Albany	12.478	$124,780	16.8864	$211,080	15.5184	$31,037	$366,897
Chicago	16.4235	164,235	22.1988	277,485	20.4228	40,846	482,566

Figure 3

SIMPLIFIED PLANT LAYOUT FOR A PASTEURIZER/COOLER AND SPIN COOLER PLANT

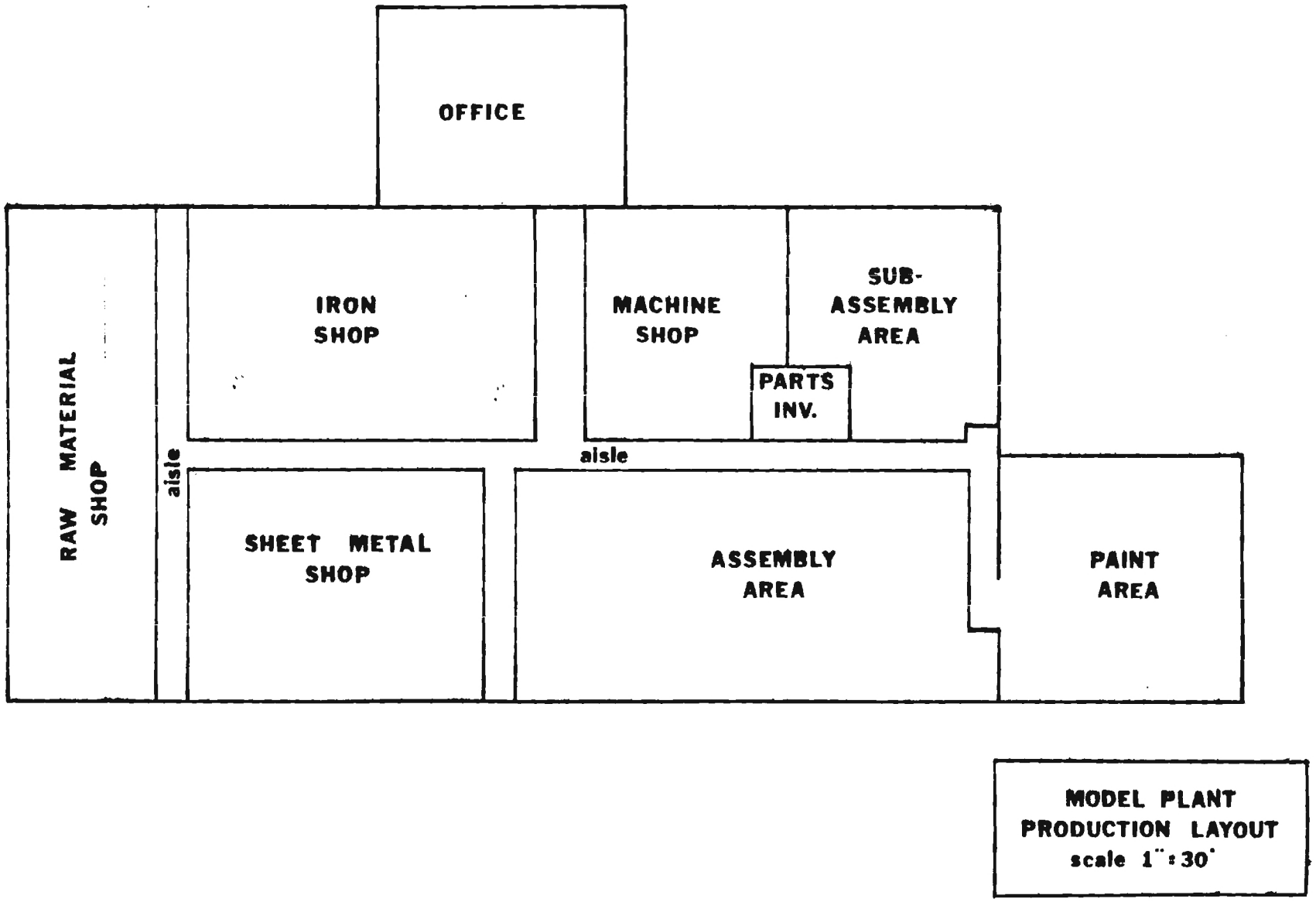


Figure 4

SIMPLIFIED PRODUCTION FLOW FOR A MODEL PRODUCTION OF PASTEURIZER/COOLERS AND SPIN COOLERS

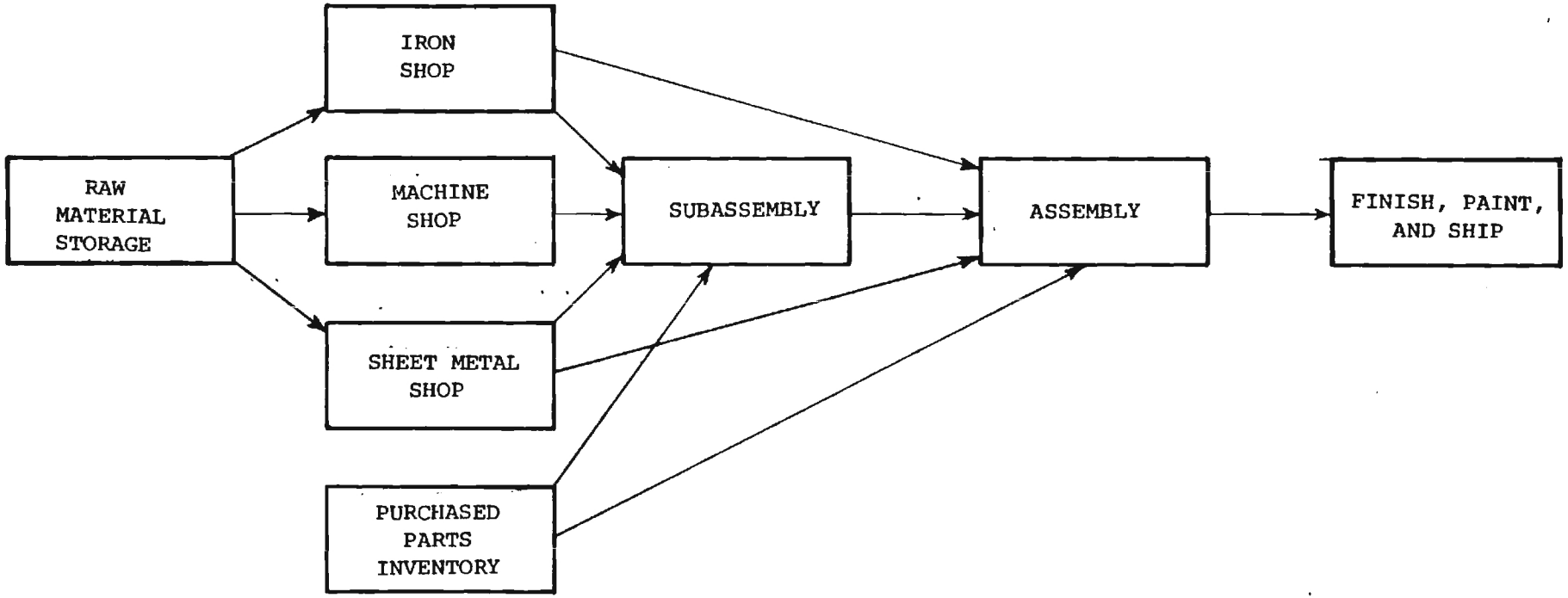


Table 30

ESTIMATED COST OF PRODUCTION EQUIPMENT REQUIRED

Description of Equipment	Quantity Needed	Cost Each	Total Cost
Machine Shop			
Lathe	1	$18,304	$ 18,304
Surface Grinder	1	13,450	13,450
Drill Press	1	700	700
Milling Machine	1	4,650	4,650
Sheet Metal (Plate) Shop			
Shear	1	70,400	70,400
Press Brake	1	24,090	24,090
MIG Welders	1	1,500	1,500
Iron Shop			
Angle, Channel, Flat Bar and Rod (Iron Worker)	1	25,300	25,300
MIG Welders	2	1,500	3,000
Drill Press	1	700	700
Cutoff Saw	1	9,405	9,405
Assembly			
MIG Welders	3	1,500	4,500
Grinders - Pneumatic	3	390	1,170
Painting			
Heated Airless Electrostatic Painting System	1	12,000	12,000
Total			$189,169

Table 31

ESTIMATED COSTS FOR AUXILIARY EQUIPMENT
FOR GENERAL OPERATION OF FACILITY

Description of Equipment	Cost
Forklift	$ 9,500
10-Ton Overhead Crane (Installed)	85,000
100 CFM Air Compressor	6,215
Office Furniture	7,200
5-Ton Overhead Crane (Installed)	39,000
Office Machines	1,800
Miscellaneous	1,000
Fire Protection Equipment	2,300
Total	$152,015

These costs are estimated at $4,700 and $6,016 for Albany and Chicago, respectively.

o Engineering Expenses. Engineering services are required to oversee the entire pre-construction and construction phase, until the building and site are approved by the company. This function includes preparation of detailed building layout and corresponding construction specifications for site and building. It is also the responsibility of the engineer to evaluate and negotitate all bids submitted by contractors for work on the project. Once contracts have been reviewed and approved, it is the responsibility of the engineer to inspect all work periodically to insure quality workmanship. These fees are estimated at 5% of the total investment requirements for each location, excluding interest during construction.

o Paving. It is estimated that 17,600 ft.^{2} of pavement is necessary for parking, driveways, and walkways. The total estimated costs to be incurred for each location are: Albany, $8,116, and Chicago, $13,689.

o Contingency. Inflation, poor work scheduling, and unexpected delays are costly problems that constantly plague construction projects. These costs are estimated at $81,894 and $112,549 for Albany and Chicago, respectively.

o Interest During Construction Period. It is estimated that building construction and equipment installation would require 10 months for completion.

During this period, provisions must be made, normally by short-term insurance, to cover the capital outlay. The interest rate used for the model plant is 11%, and a building completion rate of 10% per month is assumed. These expenses for Albany and Chicago are $37,175 and $51,904, respectively.

Working Capital. The estimates for working capital requirements are based on two months of raw materials and one month of finished inventory, receivables, and cash on hand. It is common practice in the food processing industry for the customer to advance the manufacturer 25% to 30% of the sales price when placing the initial order. Upon completion of the job, payment is made for 60% to 65% of the total price, and the remaining 10% is paid within 10 days of delivery to the customer. Therefore, at any one time receivables should account for 20% of the average monthly sales. Cash-on-hand necessary for normal operation and to take advantage of cash discounts is estimated at $150,000. The estimated working capital required of $465,636 should be essentially constant for the two locations.

Production Costs

Production costs are separated into two categories, variable costs and fixed costs. The types of costs under each of these categories are discussed below.

Variable Costs. The costs of raw materials, direct labor, utilities, and certain miscellaneous items are direct costs. They are dependent on the production level and fluctuate accordingly.

o Raw Materials. Raw materials necessary for the production of the spin coolers and the pasteurizer/coolers are similar to that required for most machinery designed for handling food packaged in cans and jars.

The machinery consists basically of long heating and cooling chambers fabricated from 12-gage and 16-gage mild sheet steel and stainless steel. The food product being processed is transported through the heat/cooling chambers by various conveyor systems. While in the heating/cooling chambers, the heat transfer is accomplished by means of both water and forced air.

The specifics on the raw materials and purchased components used for costing purposes in the model plants for both the spin coolers and pasteurizers/coolers are included in Appendices 21 and 22. The total annual costs of raw materials and purchased components (pumps, blowers, motors, etc.) are included

in Table 32. The annual costs of raw material and purchased components for 14 pasteurizer/coolers and 18 spin coolers are: Albany, $1,084,826, and Chicago, $1,203,990.

Table 32

ANNUAL COSTS OF RAW MATERIAL AND PURCHASED COMPONENTS
(Assuming Full Production of Pasteurizer/Coolers and Spin Coolers)

Product	Albany	Chicago
Pasteurizer/Cooler:		
Units per year	14	14
Unit cost	$ 49,999	$ 56,415
Total cost	$ 699,986	$ 789,810
Spin Cooler:		
Units per year	18	18
Unit cost	$ 21,380	$ 23,010
Total cost	$ 384,840	$ 414,180
Total Annual Costs	$1,084,826	$1,203,990

o Direct Labor. The direct labor requirements established in this study are considered minimal to meet production demands for projected sales. The direct labor personnel are divided into five production cost centers: iron shop, sheet metal shop, machine shop, assembly, and painting/finishing. The job descriptions and corresponding wage rate for each position are listed in Table 33. The total direct labor costs, including fringe benefits, for Albany and Chicago are $359,040 and $502,656, respectively.

o Utilities. Utilities include electric power, water, sewer, and #2 fuel oil. The cost breakdown for total utility requirements is shown in Table 34. The estimated total annual utility cost for Albany is $17,931. The estimate for Chicago is $32,783. Total utility costs in Albany are 45% less than in Chicago. Electric power clearly accounts for 70% to 90% of the total costs of utilities at each location, depending on heating demands. The approximate electric costs per year, at present rates, for Albany and Chicago are $14,568 and $23,027, respectively.

Table 33

WAGE RATES AND DIRECT LABOR COSTS FOR MODEL PLANT
(in dollars)

Job Description	Albany Rates/Hour Each	Albany Rates/Hour Total	Albany Annual Cost	Chicago Rates/Hour Each	Chicago Rates/Hour Total	Chicago Annual Cost
Machine Shop						
1 Lathe Operator	5.50	5.50	11,000	7.04	7.04	14,080
1 Drill Press and Surface Grinder	5.50	5.50	11,000	7.04	7.04	14,080
1 Milling Machine and Surface Grinder	5.50	5.50	11,000	7.04	7.04	14,080
Sheet Metal						
1 Shear Operator	6.00	6.00	12,000	7.68	7.68	15,360
1 Shear Operator Helper	5.50	5.50	11,000	7.04	7.04	14,080
1 Press Brake Operator	6.00	6.00	12,000	7.68	7.68	15,350
1 MIG Welder/Press Brake Operator Helper	5.50	5.50	11,000	7.04	7.04	14,080
Iron Shop						
1 Iron Worker Operator	5.50	5.50	11,000	7.04	7.04	14,080
1 Drill Press Operator	5.50	5.50	11,000	7.04	7.04	14,080
1 Cutoff Saw Operator	5.50	5.50	11,000	7.04	7.04	14,080
1 MIG Welder	6.00	6.00	12,000	7.68	7.68	15,360
Assembly						
3 MIG Welders	6.00	18.00	36,000	7.68	23.04	46,080
2 Grinders - Pneumatic	5.50	11.00	22,000	7.04	14.08	28,160
4 Assembly	5.50	22.00	44,000	7.04	28.16	56,320
Painting						
2 Painters	5.50	11.00	22,000	7.04	14.08	28,160
General						
2 Maintenance	5.50	11.00	22,000	7.04	14.09	28,160
1 Parts Inventory Attendant/Shipper/ Receiver	5.25	5.25	10,500	6.72	6.72	13,440
Direct Labor Costs			280,500			359,040
Plus Fringe Benefits		28%	78,540		40%	143,616
Total			359,040			502,656

Table 34

ANNUAL COST OF UTILITIES REQUIRED IN OPERATION OF MODEL PLANT

Utility	Albany	Chicago
Electricity		
Approximate consumption per month (KWH)	41,000	41,000
Cost per year	$14,568	$23,027
Water		
Approximate consumption per month (gal.)	40,000	40,000
Cost per year	$ 242	$ 226
Sewer		
Approximate consumption per month (gal.)	40,000	40,000
Cost per year	$ 182	-
Fuel Oil[1/]		
Approximate consumption per year (gal.)	6,390	20,900
Cost per year	$ 2,939	$ 9,530
Total Annual Cost of Utilities	$17,931	$32,783

1/ Fuel oil used for heating purposes only.

Considering the price increases the electric utilities have been experiencing during recent years, it can only be assumed that this trend will continue. If so, these prices should increase at an average rate of 7% to 10% per year.

Fuel oil is required for heating the office and production areas. Rather than attempting to heat the entire production area, infrared heaters should be employed to supply heat to individual work stations.

Heating requirements are different for each location due to the differences in climate. The universal tool used to reflect this relative coldness is the degree-day, a unit that represents one degree below 65 degrees in the mean daily outdoor temperature. Albany averages 1,872 degree-days per year, and Chicago has an average of 6,127. Details of the heating costs in each of these locations are included in Table 35.

Since there is no requirement for process water in this plant, water and sewer costs are nominal. These estimated expenditures are shown in Table 34.

Table 35

ANNUAL HEATING COSTS IN TWO LOCATIONS USING #2 FUEL OIL

	Albany	Chicago
Average degree-days per year	1,873	6,127
Approximate consumption of fuel oil per year (gals.)	6,390	20,900
Cost of #2 fuel oil ($/gal.)	.460	.456
Total heating cost per year	$2,939	$ 9,530

o *Miscellaneous*. Miscellaneous expenses are items such as welding stick wire, grinding wheels, oxygen, acetylene, saw blades, jigs, and dies. These costs are calculated at $17,086 and $19,862, for Albany and Chicago, respectively.

Fixed Costs. The costs of administrative personnel, depreciation, interest, ad valorem taxes, insurance, and certain miscellaneous expenses are fixed costs. They tend to be constant over fixed time intervals regardless of the production level.

o *Administrative*. The administrative and general personnel provided for in this model plant are considered minimum for the normal operation of the plant. Table 36 shows the estimated annual salaries for all administrative and general personnel. These total salaries, including fringe benefits, are Albany, $192,640, and Chicago, $269,696.

o *Depreciation*. Annual depreciation schedules for the buildings, manufacturing equipment, and general operating and office equipment are shown in Table 37. The buildings would be amortized in 20 years, manufacturing equipment in 12 years, and general operating and office equipment in 10 years. Straight-line depreciation is assumed for all schedules.

o *Interest*. Interest is applicable to monies borrowed by the firm for fixed capital investment and working capital. In this analysis, interest is assumed to be the same regardless of location. This might not be the case when actual construction begins. The rate for each location could vary depending on the individual company applying, the existing prime interest rate, and the

Table 36

COSTS OF ADMINISTRATIVE AND GENERAL PERSONNEL FOR MODEL PLANT
(in dollars)

Job Title	Albany		Chicago	
	Annual Salary	Total	Annual Salary	Total
1 - Plant Manager	20,000	20,000	25,600	25,600
1 - Secretary/Receptionist	7,500	7,500	9,600	9,600
1 - Engineering/Sales Manager	18,000	18,000	23,040	23,040
1 - Manufacturing Engineer	14,000	14,000	17,920	17,920
2 - Draftsmen	10,000	20,000	12,800	25,600
1 - Accounting/Personnel Manager	17,000	17,000	21,760	21,760
1 - Payroll Clerk	8,500	8,500	10,880	10,880
1 - Purchasing/Shipping/ Receiving Clerk	11,000	11,000	14,080	14,080
1 - Parts Inventory Attendant/ Shipper/Receiver	9,500	9,500	12,160	12,160
1 - Production/Quality Control Manager	18,000	18,000	23,040	23,040
1 - Janitor	7,000	7,000	8,960	8,960
Indirect Labor Costs		150,500		192,640
Plus Fringe Benefits	28%	42,140	40%	77,056
Total		192,640		269,696

Table 37

ANNUAL DEPRECIATION SCHEDULES FOR BUILDINGS, MANUFACTURING EQUIPMENT, AND GENERAL OPERATING AND OFFICE EQUIPMENT

Item	Life (Years)	Albany		Chicago	
		Value	Annual Depreciation	Value	Annual Depreciation
Building	20	$365,897	$18,295	$482,563	$24,128
Manufacturing Equipment	12	189,214	15,768	189,214	15,768
General Operating and Office Equipment	10	152,015	15,202	160,415	16,042
Total Annual Depreciation			$49,265		$55,938

availability of funds. The rate applied to the fixed capital investments in this study is 10%. The interest for working capital is also calculated at 10%.

It is assumed that the model plant will arrange for 20% of the fixed capital investment and 30% of the working capital to be covered with existing funds within the company. Therefore, only 80% of the fixed capital investment and 70% of the working capital will be financed. The fixed capital investment will be financed for 20 years, while the working capital will be financed for only three years. Estimated annual interest payments for fixed capital investment and working capital are shown in Table 38.

o Ad Valorem Taxes. The ad valorem tax rates for Albany and Chicago are as follows:

Albany	- Assessment:	40% of real market value
	- Rate:	$37.786 per $1,000 assessed value
Chicago	- Assessment:	40% of real market value
	- Rate:	$88.73 per $1,000 assessed value

Based on these rates, annual property taxes for a plant in each location are listed in Table 39. The taxes for Albany are estimated to be only 31% of those for a Chicago location.

o Insurance. Insurance rates vary depending on many factors -- type of construction, in-house fire protection, fire district, and others. Estimates were made for each location, based on the following assumptions: production area to be constructed of prefab steel; office area is tilt-up slab construction; both production and office areas are sprinkled; plant will be located within industrial park with adequate water supply and pressure. Even with these assumptions, much of the actual rate itself depends on the fire insurance classification of each particular location. The rates for fire and other extended risks coverage in Albany is estimated at 32 cents per hundred dollars on building, machinery, and raw material inventory.

Table 40 contains a detailed listing of the costs associated with insuring the above items in each of the two locations.

o Miscellaneous Expenses. Miscellaneous expenses are items such as office supplies, janitorial supplies, automobile rentals, travel expenses, and sales literature. These expenses are estimated at 2.5% of the total fixed costs for each location. The estimated expenses are $11,880 for Albany and $15,475 for Chicago.

Table 38

ANNUAL INTEREST COSTS FOR MODEL PLANT FOR TWO LOCATIONS

Location	Total Amount	Principal Financed	Interest Rate	Annual Interest	Total Annual Interest
Albany					
Fixed Capital	$ 943,106	$ 754,485	10%	$ 87,460	$218,529
Working Capital	465,636	325,945	10	131,069	
Chicago					
Fixed Capital	$1,294,718	$1,035,774	10%	$120,067	$251,136
Working Capital	465,636	325,945	10	131,069	

Table 39

AD VALOREM TAXES IN TWO LOCATIONS

Location	Fair Market Evaluation of Building and Equipment	Assessed Ratio	Assessed Value	Assessed Rate per $1,000 Assessed Value	Total Taxes per Year
Albany	$ 768,081	40%	$307,232	$37.786	$11,609
Chicago	$1,052,150	40%	$420,860	$88.730	$37,343

Table 40

INSURANCE COSTS IN TWO LOCATIONS

	Albany	Chicago
Costs of Covered Items:		
Land and building	$426,897	$ 702,566
Production equipment	189,169	189,169
Auxiliary equipment	152,015	160,415
Raw material and finished product	218,880	218,880
Total cost of covered items	$986,961	$1,271,030
Cost for Fire and Other Extended Risks Coverage:		
Cost per hundred	$ .320	$ .384
Total cost	$ 3,158	$ 4,881

Total Production Costs. A summary of annual production costs is provided in Table 41. Total production costs are estimated at $1,965,964 for the Albany location and $2,393,760 for the Chicago location. The annual production costs at Albany, therefore, are estimated to be $427,796 lower than Chicago.

Table 41

ESTIMATED ANNUAL PRODUCTION COSTS OF MODEL PLANT IN TWO LOCATIONS

Cost Classification	Albany	Chicago
Variable Costs		
Raw Material	$1,084,826	$1,203,990
Labor	359,040	502,656
Utilities	17,931	32,783
Miscellaneous	17,086	19,862
Subtotal	$1,478,883	$1,759,291
Fixed Costs		
Administrative Personnel	$ 192,640	$ 269,696
Ad Valorem Taxes	11,609	37,343
Interest and Debt Service	218,529	251,136
Insurance	3,158	4,881
Depreciation	49,265	55,938
Miscellaneous	11,880	15,475
Subtotal	$ 487,081	$ 634,469
Total Annual Production Costs	$1,965,964	$2,393,760

Projected Returns

The model plant is designed to produce 18 pasteurizer/coolers and 14 spin coolers per year. The annual expected returns for the manufacture and sale of these items are listed in Table 42. The total gross sales for the company would average $2,501,184 a year. The average f.o.b. sales price represents actual f.o.b. price excluding the manufacturers' representative distribution discount.

Table 42

ESTIMATED ANNUAL RETURNS FOR MODEL PLANT

Item	Units per Year	Average f.o.b. Sales Price per Unit	Annual Return
Pasteurizer/Cooler	14	$113,019	$1,582,266
Spin Cooler	18	$ 51,051	918,918
Total			$2,501,184

A summary of estimated costs and profits on production for the model at each location (Albany and Chicago) is listed in Table 43. Cash discounts and advertising and promotional expenses account for 5% of gross sales each. When these amounts have been deducted from the gross sales, the remainder is the net sales for each location. After deducting the manufacturing costs (variable and fixed costs), operating profits are derived. Net profit after taxes is determined by deducting 48% of the profit for federal taxes and 6% for state taxes.

The model plant yields an after-taxes net profit of $131,145 for the Albany location. In contrast, the Chicago location would have a net loss of $142,697. On net profit before taxes as a percent of net sales, the Albany location is 12.7%, and the Chicago location is negative. Percent return on fixed investment is 13.9% for the Albany location and negative for the Chicago location. In summary, the Albany location has a distinctive advantage over the Chicago location. A plant located in Chicago would be forced to sell its product at a higher price than one in Albany or it would be forced to operate at a loss to maintain its production.

Table 43

SUMMARY STATEMENT OF ESTIMATED COSTS AND RETURNS
ON A MODEL PRODUCTION PLANT IN TWO LOCATIONS

	Albany	Chicago
Gross Sales	$2,501,181	$2,501,181
Less Advertising and Promotion	250,118	250,118
Net Sales	$2,251,063	$2,251,063
Manufacturing Costs		
Variable Costs	1,478,883	1,759,291
Fixed Costs	487,081	634,469
Net Profit before Taxes	$ 285,099	($ 142,697)
Federal Taxes 48%	136,848	
State Taxes 6%	17,106	
Net Profit after Taxes	$ 131,145	
Net Profit before Taxes as a % of Net Sales	12.7	
Present Return on		
Fixed Investment	13.9	
Total Investment	9.3	
Net Sales	5.8	
Payout Period	7 years	-

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APPENDICES

Appendix 1

THE VALUE OF SHIPMENTS OF FOOD AND KINDRED PRODUCTS IN THE UNITED STATES, 1964 TO 1976
(in millions of dollars)

Industry[1/]	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
SIC 20	71,597.5	73,917.7	79,750.9	83,975.2	87,327.4	93,379.9	98,533.0	103,630.9	115,051.5	135,582.5	162,104.2	172,157.6	180,929.7
SIC 201	17,599.5	18,565.6	20,325.4	21,520.1	22,454.1	24,802.7	25,460.8	26,078.5	31,477.9	37,941.6	40,035.3	43,816.7	45,826.9
SIC 202	11,715.8	11,573.5	12,204.5	12,815.1	13,176.9	13,562.1	13,771.7	14,813.3	16,311.5	18,016.2	20,879.6	22,668.0	24,830.3
SIC 203	7,768.9	8,207.4	8,810.8	8,136.2	10,028.9	10,537.0	10,971.9	11,961.5	11,478.6	13,076.2	15,486.5	16,804.2	17,721.5
SIC 204	8,315.9	8,433.7	9,242.0	9,894.5	9,849.2	10,347.6	10,923.0	11,209.6	12,162.2	16,095.7	20.225.2	20,661.2	21,189.1
SIC 205	5,816.0	5,949.7	6,334.4	6,466.5	6,656.0	6,961.3	7,081.8	7,357.2	7,895.5	8,577.9	10,529.4	11,730.2	12,229.7
SIC 206	2,056.0	2,010.2	2,112.9	2,305.0	2,427.6	2,519.3	1,855.2	2,857.0	6,620.1	7,244.7	12,331.3	11,423.2	10,405.0
SIC 207	2,271.8	2,295.5	2,434.2	2,694.4	2,863.6	3,058.6	3,293.4	3,442.3	6,900.8	10,377.8	14,056.6	12,781.4	12,801.2
SIC 208	7,446.2	7,710.1	8,347.2	9,102.8	10,007.8	11,039.2	12,373.2	13,330.8	13,869.4	14,662.7	17,225.7	20,395.3	21,068.6
SIC 209	8,607.4	9.172.0	9,939.6	9,945.0	9,863.3	10,522.3	11,976.9	12,580.7	8,335.5	9,594.6	10,784.6	11,877.4	14,857.3

1/ SIC 20 Food and Kindred Products
SIC 201 Meat Products
SIC 202 Dairy Products
SIC 203 Canned, Cured, and Frozen Foods
SIC 204 Grain Mill Products
SIC 205 Bakery Products
SIC 206 Sugar and Confectionery
SIC 207 Fats and Oils
SIC 208 Beverages
SIC 209 Miscellaneous

Source: U. S. Department of Commerce, Bureau of the Census, Annual Survey of Manufactures.

Appendix 2

POPULATION GROWTH IN THE SEVEN-STATE AREA, 1950-1976
(in thousands)

State	1950	1960	1970	1976*
Alabama	3,062	3,267	3,444	3,665
Florida	2,771	4,952	6,789	8,421
Georgia	3,445	3,943	4,590	4,970
Mississippi	2,179	2,179	2,217	2,354
North Carolina	4,062	4,556	5,082	5,469
South Carolina	2,117	2,383	2,591	2,848
Tennessee	3,292	3,567	3,924	4,214
Seven-State Total	20,928	24,846	28,637	31,941
United States	151,326	179,323	203,212	214,659
Seven-State % of U. S.	13.8	13.9	14.1	14.9

* Estimated.

Source: U. S. Department of Commerce, Bureau of the Census, Current Population Reports, Series P-25, No. 373 and Series P-25, No. 642.

Appendix 3

NONAGRICULTURAL EMPLOYMENT, 1950-1972
(in thousands)

State	1950	1960	1970	1972
Alabama	619.6	776.4	010.4	1,065.2
Florida	704.4	1,320.6	2,069.9	2,407.6
Georgia	806.6	1,051.1	1,531.7	1,670.6
Mississippi	311.6	404.0	567.8	629.7
North Carolina	927.8	1,195.5	1,747.0	1,847.3
South Carolina	461.4	582.5	819.8	918.9
Tennessee	759.3	925.5	1,309.8	1,450.4
Seven-State Total	4,590.7	6,255.6	9,056.4	9,989.6
United States	45,222	54,234	70,593	72,764
Seven-State % of U. S.	10.2	11.5	12.8	18.7

Source: U. S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, States and Areas, 1939-72.

Appendix 4

MANUFACTURING EMPLOYMENT, 1950-1972
(in thousands)

State	1950	1960	1970	1972
Alabama	216.1	237.0	323.8	327.8
Florida	102.3	206.7	321.6	334.7
Georgia	286.5	340.8	465.6	473.2
Mississippi	86.4	119.9	181.7	204.8
North Carolina	418.3	509.3	718.6	735.5
South Carolina	210.4	244.8	340.0	353.6
Tennessee	249.9	315.6	464.6	488.3
Total	1,569.9	1,974.1	2,815.9	2,917.9
United States	15,241	16,796	19,349	19,090
Seven-State % of U. S.	10.2	18.1	14.6	15.3

Source: U. S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings Statistics for States and Area, 1939-72.

Appendix 5

CONSTRUCTION EMPLOYMENT, 1950-1972
(in thousands)

State	1950	1960	1970	1972
Alabama	28.2	43.2	49.2	57.4
Florida	66.8	121.8	171.8	203.9
Georgia	40.3	55.3	77.8	93.8
Mississippi	16.9	22.5	32.5	35.2
North Carolina	48.0	65.2	96.5	99.1
South Carolina	24.3	34.6	51.5	61.0
Tennessee	46.2	46.8	63.1	76.2
Total	270.9	389.4	542.4	626.6
United States	2,333	2,885	2,951	3,166
Seven-State % of U. S.	11.6	13.5	18.4	19.8

Source: U. S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings Statistics for States and Areas, 1939-1972.

Appendix 6

TOTAL PERSONAL INCOME, 1950-1976
(in millions of dollars)

State	1950	1960	1970	1976
Alabama	2,691	4,876	9,715	17,704
Florida	3,599	9,746	24,300	48,717
Georgia	3,574	6,489	15,186	26,184
Mississippi	1,613	2,552	5,803	10,254
North Carolina	4,219	7,142	16,246	28,141
South Carolina	1,886	3,298	7,576	13,738
Tennessee	3,295	5,521	12,049	21,413
Total	20,877	39,625	90,825	196,151
United States	227,228	398,725	797,081	1,322,748
Seven-State % of U. S.	9.2	9.9	11.4	14.8

Source: U. S. Department of Commerce, Survey of Current Business.

Appendix 7

PER CAPITA PERSONAL INCOME, 1950-1976

State	1950	1960	1970	1976
Alabama	$ 880	$1,488	$2,876	$5,106
Florida	1,281	1,950	3,664	6,020
Georgia	1,034	1,639	3,354	5,548
Mississippi	755	1,205	2,597	4,529
North Carolina	1,037	1,561	3,218	5,453
South Carolina	893	1,377	2,933	5,147
Tennessee	994	1,543	3,075	5,364
Seven-State Average	$ 982	$1,537	$3,102	$5,310
U. S. Average	$1,496	$2,215	$3,933	$6,399
Seven State % of U. S.	65.6	69.4	78.9	83.0

Source: U. S. Department of Commerce, Survey of Current Business.

Appendix 8

TOTAL LONG-TERM SAVINGS OF INDIVIDUALS, 1950-1975
(in millions of dollars)

State	1950	1960	1970	1975
Alabama	$ 1,010	$ 2,461	$ 6,080	$ 11,686
Florida	1,547	6,709	19,947	44,191
Georgia	1,494	3,695	9,420	17,250
Mississippi	445	1,174	3,090	5,997
North Carolina	1,681	3,819	9,756	18,065
South Carolina	736	1,732	4,019	7,594
Tennessee	1,410	3,335	8,400	15,949
Total	$ 8,323	$ 22,925	$ 60,712	$ 120,732
United States	$123,071	$268,197	$616,216	$1,089,392
Seven-State % of U. S.	6.8	8.5	9.9	11.1

Source: Federal Reserve Bank of Atlanta, Research Department, and Federal Reserve Bank of Richmond, Research Department.

Appendix 9

WHOLESALE TRADE SALES, 1954-1972
(in millions of dollars)

State	1954	1958	1963	1967	1972
Alabama	$ 2,327	$ 2,853	$ 3,395	$ 4,437	$ 7,385
Florida	3,402	5,512	7,487	10,303	19,720
Georgia	4,548	5,741	8,100	11,459	19,465
Mississippi	1,184	1,389	1,787	2,309	3,707
North Carolina	4,184	5,026	6,983	9,530	15,589
South Carolina	1,341	1,605	1,993	2,745	4,568
Tennessee	4,564	5,153	6,677	8,678	14,578
Total	$ 25,131	$ 27,279	$ 36,422	$ 49,461	$ 85,012
United States	$235,651	$285,727	$358,386	$459,475	$683,659
Seven-State % of U. S.	9.1	9.5	10.2	10.8	12.4

Source: U. S. Department of Commerce, Bureau of the Census, Census of Business, 1954-1972.

Appendix 10

RETAIL SALES, 1950-1976
(in millions of dollars)

State	1950	1960	1970	1976
Alabama	$ 1,743	$ 2,922	$ 4,792	$ 10,167
Florida	2,810	6,783	13,315	31,029
Georgia	2,311	3,924	7,439	15,155
Mississippi	1,074	1,657	2,924	6,092
North Carolina	2,624	4,360	7,833	15,088
South Carolina	1,258	1,908	3,665	7,509
Tennessee	2,214	3,484	6,217	12,748
Total	$ 14,034	$ 25,038	$ 46,185	$ 91,696
United States	$140,691	$214,837	$360,954	$661,749
Seven-State % of U. S.	10.0	11.4	17.8	13.9

Source: Sales and Marketing Management, Survey of Buying Power, 1951-1976, New York.

Appendix 11

VALUE ADDED BY MANUFACTURE, 1950-1976
(in millions of dollars)

State	1950	1960	1970	1976
Alabama	$ 1,040	$ 1,958	$ 4,339	$ 6,623.4
Florida	449	1,797	4,560	7,461.2
Georgia	1,236	2,497	5,483	9,785.3
Mississippi	281	702	2,102	3,685.5
North Carolina	1,863	3,805	9,053	13,642.6
South Carolina	858	1,719	3,767	5,941.9
Tennessee	1,174	2,586	6,297	9,297.7
Total	$ 6,901	$ 15,064	$ 35,601	$ 56,437.6
United States	$89,750	$163,999	$299,409	$438,401.8
Seven-State % of U. S.	7.7	9.2	11.9	12.9

Source: U. S. Bureau of the Census, Annual Survey of Manufactures, 1950-1976.

Appendix 12

EXPENDITURES FOR NEW MANUFACTURING PLANTS AND EQUIPMENT, 1951-1975
(in millions of dollars)

State	1951	1960	1970	1975
Alabama	$ 97	$ 202	$ 417	$ 1,062.0
Florida	76	153	378	834.9
Georgia	115	173	453	752.3
Mississippi	42	40	274	260.1
North Carolina	166	240	714	1,225.8
South Carolina	131	144	371	805.7
Tennessee	114	217	508	836.5
Total	$ 741	$ 1,169	$ 3,115	$ 5,777.3
United States	$7,782	$10,070	$22,090	$37,409.9
Seven-State % of U. S.	9.5	11.6	14.1	15.4

Source: U. S. Department of Commerce, Bureau of the Census, Annual Survey of Manufactures, 1951-1975.

Appendix 13

INSTALLED CAPACITY OF ELECTRIC UTILITIES, 1950-1975
(in thousands of kilowatts)

State	1950	1960	1970	1975
Alabama	1,690	4,700	10,172	15,600
Florida	999	3,992	13,868	22,131
Georgia	1,156	2,236	6,739	12,446
Mississippi	200	1,008	2,524	4,152
North Carolina	1,760	4,397	9,979	15,255
South Carolina	847	2,249	4,558	11,163
Tennessee	1,670	7,521	9,753	14,578
Total	8,322	26,103	57,593	95,295
United States	68,919	174,352	360,327	524,268
Seven-State % of U. S.	12.1	15.0	16.0	18.2

Source: U. S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1976.

Appendix 14

REGISTRATION OF NEW AUTOMOBILES, 1959-1975

State	1950	1966	1969	1975
Alabama	82,114	129,693	128,491	128,860
Florida	217,014	181,269	375,087	362,818
Georgia	105,747	329,216	211,681	177,417
Mississippi	38,944	70,362	71,417	71,889
North Carolina	111,941	196,040	218,109	173,778
South Carolina	52,570	96,381	99,248	91,807
Tennessee	87,650	155,617	160,059	157,343
Total	695,198	1,158,578	1,264,092	1,163,912
United States	6,026,500	9,008,488	9,446,524	8,261,840
Seven-State % of U. S.	11.5	12.9	13.4	14.1

Source: Ward's Automotive Yearbook, 1960-1975.

Appendix 15

FOOD PRODUCTS MACHINERY INDUSTRY
MAJOR END PRODUCTS VS. TYPE OF LABOR REQUIRED

Company	Major End Products	Labor Required - Nonskilled and Skilled
1	Plastic Film, Machinery, and Plastic Bags	N/S - Bag Machine Operators, Machine Assemblers S - Printers, Film Extruders
2	Food Processing Equipment, Material Handling Equipment	S - Welder, Polishers, Assemblers, Press Brake Operators, Servicemen
3	Food Processing Conveyors	N/S - Helpers S - Welders, Machinists, Mechanics, Assemblers, Installers
4	Mechanical Components for Conveying	N/S - Assemblers, Packers, Material Handlers S - Assembly Machine Operators
5	Material Handling Equipment, Pickle Harvesters	S - Welders, Machinists
6	Corrugated Shipping Containers	N/S - Bundler, Tape and Stitcher Helpers S - Corrugation Operator, Double Backer Operator, Scoreman, Mechanics
7	Package Casers	N/S - Grinders S - Electrician, Painters
8	Bin Harvesters, Tote Boxes	N/S - Assemblers S - Machinist, Sheet Metal Welders, Punch Press Operator
9	Slip-Torque Conveyors, Swinger Pattern	N/S - Punch Press Operator, Assembly Operator, Cutoff Saw Operator, Shear Operator S - Lathe Operator, Welder, Bore Machine Operator
10	Palletizers, Depalletizers, Conveying Systems, Material Handling Devices	N/S - Stock, Metal Preparers S - Machinist, Welder, Electrician, Mechanic, Assembler, Draftsman

(Continued)

Appendix 15 (Continued)

Company	Major End Products	Labor Required - Nonskilled and Skilled
11	Bucket Elevators, Belt Conveyors	N/S - Shippers, Painters, Assemblers S - Welders, Machinists, Tool and Die Makers
12	Conveyors, Food Container Handling Equipment	N/S - Helpers S - Machine Builders, Machinists, Welders, Fabricators
13	Imprinting, Coding, Marking, and Printing Machinery	N/S - Packers, Painters S - Machinists, Welders, Tool Makers, Assemblers
14	Carton Forming Machinery, Carton Labeling and Sealing Machinery	N/S - Apprentice Helpers S - Machinists, Welders, Mechanics, Draftsmen
15	Glass Forming Machinery, Margarine Packaging Machinery	N/S - Truck Driver, Forklift Operator S - Machine Operator, Electrician, Assemblers, Inspectors, Maintenance Men
16	Meat Processing Equipment - Saws, Mixers, Grinders, Choppers, Flakers	N/S - Grinder, Polisher S - Machinists, Welders
17	Food Processing Equipment	N/S - Helpers S - Welders, Grinders, Layout Men
18	Stainless Steel Processing Equipment	N/S - Shipping Clerk S - Welders, Polishers, Layout Men, Machinists
19	Food Processing Machineries	-
20	Size Reduction Equipment	-
21	Food Processing Machinery	S - Machinists
22	Food Processing Equipment	N/S - Electronic Assemblers S - Metal Fabricators, Electronic Servicemen
23	Motionless Mixers	S - Shippers, Machine Shop, Welders
24	Stainless Steel Tanks	N/S - Helpers S - Welders, Grinders

(Continued)

Appendix 15 (Continued)

Company	Major End Products	Labor Required - Nonskilled and Skilled
25	Tanks, Processors	N/S - Stock Handler, General Laborer S - Welder, Fabricator, Metal Finisher
26	Clarifiers, Filters, Separators	S - Sheet Metal Workers
27	Tanks and Pressure Vessels, Aseptic Systems	N/S - Helpers S - Welders, Layout Man, Machinist, Blasters, and Painters
28	Heat Exchangers, Evaporators, Distillation	-
29	Water Heaters	N/S - Assemblers S - Machine Operator
30	Centrifugal Compressors, Blowers and Pumps	S - Machinists, Assemblers, Welders, Engineers
31	Rotary Positive Displacement Pumps, Blenders, Cotton Mills	-
32	Industrial Control Devices	S - Electronic Technician
33	Electrical Enclosures, Insect Electrocution Units, Barn Equipment	N/S - Assembler S - Sheet Metal Fabricator, Painters
34	Electronic/Optical Inspection Machinery, Electronic Instruments	S - Electronic Technicians, Mechanic Assembler, Machinists
35	Process Instrumentation and Computers	-
36	Temperature and Pressure Instrumentation and Control	S - Pneumatic Controls Technician, Machinists
37	Bottle Washers, Case Packers	N/S - Laborers, Machine Operator S - Tool Makers, Machinists, Assemblers
38	Packaging Machinery	N/S - Assembler S - Foreman, Purchasing Manager
39	Bottle Labeling, Mixers, Fillers	N/S - Packers, General Laborers S - Extrusion Operator, Molding Operator, Injection, Equipment Operator

(Continued)

Appendix 15 (Continued)

Company	Major End Products	Labor Required - Nonskilled and Skilled
55	Marking Equipment for Industry	N/S - Assemblers S - Machinists, Tool and Die Makers, Maintenance Men
56	Service Industry - Install Machinery	N/S - Laborer, Janitor S - Millwright, Engineer, Rigger, Welder, Metalworkers, Machinists
57	Cleaning, Sanitation, Metal Treating Chemicals	N/S - General Laborers S - Engineers, Computer Operator, Managers
58	Vibrating Feeders, Conveyors, Processing and Drying, Cooling, Blending	N/S - General Laborer S - Welders, Assemblers, Machine Operator, Painters
59	Fiberglass Serving Counters, Dispensers, Salad Green Dryers	N/S - Assembly Worker, Fiberglass Worker, Shipping Clerk S - Welders, Polishers, Sheet Metal Mechanics

Source: A Survey Conducted by Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology in 1977.

Appendix 15 (Continued)

Company	Major End Products	Labor Required - Nonskilled and Skilled
40	Bottles, Poly-Film Containers, Injection Molded Parts, Bag in Box Container	N/S - Loaders, Female Selectors, Carton Assemblers S - Mechanics, Forming Machine Operator, Mold Makers, Lift Truck Operator, Engineers
41	Glass Containers, Closures	-
42	Salt Dispensing Equipment, Brine Makers, Electrolytic Hypochlorite Generators	-
43	Salt, Brine Control Systems, Salt Dissolver Systems	-
44	Can Tooling	S - Machinists, Tool and Die Experts
45	Can Manufacturing Equipment	-
46	Can Manufacturing Equipment	S - Machinist, Assemblymen
47	Tool and Piston Canning Industry	S - Tool and Die Makers, Machinist, Grinders
48	Tool and Die Piston Canning Industry	S - Cylinder Grinders, Lathe Operator, Milling Operator
49	Canning Machines and Equipment	N/S - Helpers S - Machinist, Mechanic, Warehouseman
50	Food Processing Equipment for Fruits and Vegetables	S - Machinists, Assembly Mechanics, Engineer, Accountant, Painter
51	Citrus Fruit Packing Equipment, Chemicals, Waxes, Industrial Fabrication	N/S - Painter, Driver S - Machinist, Welder, Draftsman, Sheet Metal Workers, Layout Men
52	Machinery, Coil Line, Classifying Line	S - Engineer, Machinist, Welders, Electrician, Fitters
53	Acoustical Panels	N/S - Heaters, Banders, Gluers
54	Automotive, Aerospace, Industrial Products	-

(Continued)

Appendix 15 (Continued)

Company	Major End Products	Labor Required - Nonskilled and Skilled
55	Marking Equipment for Industry	N/S - Assemblers S - Machinists, Tool and Die Makers, Maintenance Men
56	Service Industry - Install Machinery	N/S - Laborer, Janitor S - Millwright, Engineer, Rigger, Welder, Metalworkers, Machinists
57	Cleaning, Sanitation, Metal Treating Chemicals	N/S - General Laborers S - Engineers, Computer Operator, Managers
58	Vibrating Feeders, Conveyors, Processing and Drying, Cooling, Blending	N/S - General Laborer S - Welders, Assemblers, Machine Operator, Painters
59	Fiberglass Serving Counters, Dispensers, Salad Green Dryers	N/S - Assembly Worker, Fiberglass Worker, Shipping Clerk S - Welders, Polishers, Sheet Metal Mechanics

Source: A Survey Conducted by Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology in 1977.

Appendix 16

FOOD PRODUCTS MACHINERY INDUSTRY
MAJOR END PRODUCT VS. MATERIALS PURCHASED

Company	Major End Products	Materials Purchased
1	Plastic Film, Machinery, and Plastic Bags	Plastic Plates, Steel, Electrical Components
2	Food Processing Equipment, Material Handling Equipment	Stainless Sheet, Motors, Pumps, Electrical Switches, Structural Steel, Castings
3	Food Processing Conveyors	Steel, Aluminum, Plastic
4	Mechanical Components for Conveying	Plastic Chain, Sprockets, Modular Plastic Belting
5	Material Handling Equipment, Pickle Harvesters	Bearings, Steel, Rubber Products
6	Corrugated Shipping Containers	Kraft Linerboard and Medium Steel Strapping, Tape Adhesives, Printing Inks, Wax Coatings
7	Package Casers	Machinery Parts, Cylinders, Bearing, Motors, Conveyors, Belts, Glue Application Systems
8	Bin Harvesters, Tote Boxes	Steel, Rubber
9	Slip-Torque Conveyors, Swinger Pattern Formers	Raw Steel, Plastic Components, Bearings, Miscellaneous Hardware
10	Palletizers, Depalletizers, Conveying Systems, Material Handling Devices	Steel, Belting, Bearings, Roller Chain, Electric Motors, Air Cylinders
11	Bucket Elevators, Belt Conveyors	Steel, Belting, Bearings, Motors
12	Conveyors, Food Container Handling Equipment	Stainless Steel, Plastics, Bearings, Motors, Power Transmissions, Machinery Components
13	Imprinting, Coding, Marking, and Printing Machinery	Motors, Steel, Aluminum, Brass, Bronze, Mill Machine Parts, Packaging, Inks
14	Carton Forming Machinery, Carton Labeling and Sealing Machinery	Steel, Paint, Air Cylinders, Air Controls, Plastic Parts
15	Glass Forming Machinery, Margarine Packaging Machinery	Castings - Steel and Gray Iron, Steel Bar and Rod Forgings, Electrical Accessories

(Continued)

Appendix 16 (Continued)

Company	Major End Products	Materials Purchased
16	Meat Processing Equipment - Saws, Mixers, Grinders, Choppers, Flakers	Steel, Motors, Bearings, Electrical Components
17	Food Processing Equipment	Stainless Steel
18	Stainless Steel Processing Equipment	Stainless Steel Sheet, Rods
19	Food Processing Machineries	Stainless Steel, Power Transmission Equipment
20	Size Reduction Equipment	Gears, Knives, Motors
21	Food Processing Machinery	Metals, Components - Pumps, Motors, Controls
22	Food Processing Equipment	Stainless Steel, Electronic Components
23	Motionless Mixers	Sheet Metal, Piping
24	Stainless Steel Tanks	Steel, Electric Motors
25	Tanks, Processors	Stainless Sheets, Fittings and Valves, Carbon Steel, Truck Components, Axles, Suspensions, Tires
26	Clarifiers, Filters, Separators	Carbon Steel Sheet, Angles, Channels, Tubing, Pipe, and Fittings
27	Tanks and Pressure Vessels, Aseptic Systems	Carbon and Stainless Steel
28	Heat Exchangers, Evaporators, Distillation	-
29	Water Heaters	Valves, Fittings, Coatings
30	Centrifugal Compressors, Blowers and Pumps	Cast Iron, Stainless Steel, Motors
31	Rotary Positive Displacement Pumps, Blenders, Cotton Mills	Stainless Steel Castings
32	Industrial Control Devices	Metal Fabrication, Electronic Circuit Boards
33	Electrical Enclosures, Insect Electrocution Units, Barn Equipment	Sheet Metal, Electronic Components
34	Electronic/Optical Inspection Machinery, Electronic Instruments	Electronic Components, Carbon Rolled and Stainless Steel Plastics

(Continued)

Company	Major End Products	Materials Purchased
35	Process Instrumentation and Computers	Metals
36	Temperature and Pressure Instrumentation and Control	Stainless Tubing, Bar, Capillary, Copper Capillary, Injection Moldings, Fill Mediums
37	Bottle Washers, Case Packers	Steel Plate, Grey Iron Castings, Electrical Components, Chain and Sprocket, Pipe Fittings, Gears
38	Packaging Machinery	Steel Plate, Tubing, Pipe, Power Transmission Equipment, Electrical Controls
39	Bottle Labeling, Mixers, Fillers	Bearings, Hardware, Steel, Lumber
40	Bottles, Poly-Film Containers, Injection Molded Parts, Bag in Box Container	Poly Resin, Barrier Films, Corrugated Boxes, Threaded Caps
41	Glass Containers, Closures	Sand, Soda/Ash, Limestone, Corrugated Boxes, Molds
42	Salt Dispensing Equipment, Brine Makers, Electrolytic Hypochlorite Generators	-
43	Salt, Brine Control Systems, Salt Dissolver Systems	Fiberglass Tanks, Pumps, Motors, Plastic Piping, Electronic Components
44	Can Tooling	Tungsten Carbide, Round Steel Bars
45	Can Manufacturing Equipment	Steel, Castings, Electrical Motors, Fittings
46	Can Manufacturing Equipment	-
47	Tool and Piston Canning Industry	Carbide, Tool Steels, Nuts, Bolts, Grinding Wheels
48	Tool and Die Piston Canning Industry	Tool Steel, Carbide
49	Canning Machines and Equipment	Castings, Machined Parts
50	Food Processing Equipment for Fruits and Vegetables	Steel Bar, Shapes, Plate, Sheet, Castings, Machine Shop Supplies, Motors

(Continued)

Appendix 16 (Continued)

Company	Major End Products	Materials Purchased
51	Citrus Fruit Packing Equipment, Chemicals, Waxes, Industrial Fabrication	Ferrous and Nonferrous Metals, Material Handling Equipment, Power Transmission Equipment, Fasteners, Electric Motors and Controls
52	Machinery, Coil Line, Classifying Line	Steel, Bearings, Bronze, Motors, Controls
53	Acoustical Panels	Plastic Sheet, Corrugated Boxes, Silicone, Urethane Foam, Wedges, Stainless Steel
54	Automotive, Aerospace, Industrial Products	Steel, Webbing, Fabric
55	Marking Equipment for Industry	Chemicals, Solvents, Paper Products, Ferrous and Nonferrous Castings, Aluminum and Steel Bars, Plastic Parts, Screw Machine Parts
56	Service Industry - Install Machinery	Steel, Tools
57	Cleaning, Sanitation, Metal Treating Chemicals	Acids, Detergents, Phosphates, Sodium and Potassium Hydroxide, Chelating Agents, Chlorine and Ammonia Compounds
58	Vibrating Feeders, Conveyors, Processing and Drying, Cooling, Blending	Motors, Steel, Drive Transmission Equipment, Machining, Controls
59	Fiberglass Serving Counters, Dispensers, Salad Green Dryers	Stainless Sheet, Galvanized Steel, Stainless Tubing, Fiberglass, Springs, Casters, Refrigeration Units, Electric Motors, Controls, Plastic Resins

Source: A Survey Conducted by Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology in 1977.

Appendix 17

FOOD PRODUCTS MACHINERY INDUSTRY
MAJOR END PRODUCTS VS. OUTSIDE SUPPORTING SERVICES REQUIRED

Company	Major End Products	Outside Supporting Service Required
1	Plastic Film, Machinery, and Plastic Bags	Stamping, Forging, Bearings
2	Food Processing Equipment, Material Handling Equipment	Machining, Rolling, Plasma Cutting
3	Food Processing Conveyors	Plating, Casting
4	Mechanical Components for Conveying	Injection Molding
5	Material Handling Equipment, Pickle Harvesters	-
6	Corrugated Shipping Containers	Machine Shops, Construction Contractors
7	Package Casers	Die Casting, Special Conveyors
8	Bin Harvesters, Tote Boxes	-
9	Slip-Torque Conveyors, Swinger Pattern Formers	Molding
10	Palletizers, Depalletizers, Conveying Systems, Material Handling Devices	Machine Shop, Forming
11	Bucket Elevators, Belt Conveyors	-
12	Conveyors, Food Container Handling Equipment	Foundries, Precision Machinery
13	Imprinting, Coding, Marking, and Printing Machinery	Stamping, Plating
14	Carton Forming Machinery, Carton Labeling and Sealing Machinery	-
15	Glass Forming Machinery, Margarine Packaging Machinery	Forging, Casting, Heat Treatment, Screw Machine Parts
16	Meat Processing Equipment - Saws, Mixers, Grinders, Choppers, Flakers	-
17	Food Processing Equipment	Forging, Galvanizing, Chrome, and Nickel Outside Processing or Outside of Pans and Cabinets

(Continued)

Appendix 17 (Continued)

Company	Major End Products	Outside Supporting Service Required
18	Stainless Steel Processing Equipment	-
19	Food Processing Machineries	-
20	Size Reduction Equipment	-
21	Food Processing Machinery	Castings and Coatings
22	Food Processing Equipment	Precision Metal Fabrication
23	Motionless Mixers	Stamping, Coating, Transportation, Sand Blasting, Fiberglass
24	Stainless Steel Tanks	-
25	Tanks, Processors	Heavy Machining, Treating
26	Clarifiers, Filters, Separators	Sheet Metalworking, Protective Coating (Epoxy)
27	Tanks and Pressure Vessels, Aseptic Systems	-
28	Heat Exchangers, Evaporators, Distillation	-
29	Water Heaters	Casting
30	Centrifugal Compressors, Blowers and Pumps	Forging, Machining
31	Rotary Positive Displacement Pumps, Blenders, Cotton Mills	-
32	Industrial Control Devices	-
33	Electrical Enclosures, Insect Electrocution Units, Barn Equipment	Plating, Forging
34	Electronic/Optical Inspection Machinery, Electronic Instruments	Casting, Silk Screen, Printed Circuit Board
35	Process Instrumentation and Computers	-
36	Temperature and Pressure Instrumentation and Control	Injection Molding, Chrome Plating, Stamping
37	Bottle Washers, Case Packers	Plastic Molded Parts, Machinery, Subcontracting

(Continued)

Appendix 17 (Continued)

Company	Major End Products	Outside Supporting Service Required
38	Packaging Machinery	Stamping
39	Bottle Labeling, Mixers, Fillers	-
40	Bottles, Poly-Film Containers, Injection Molded Parts, Bag in Box Container	Laminating, Metal Inserts
41	Glass Containers, Closures	-
42	Salt Dispensing Equipment, Brine Makers, Electrolytic Hypochlorite Generators	-
43	Salt, Brine Control Systems, Salt Dissolver Systems	Fiberglass Tank Fabrication
44	Can Tooling	Carbide Manufacturing
45	Can Manufacturing Equipment	-
46	Can Manufacturing Equipment	Foundries
47	Tool and Piston Canning Industry	Small Machine Shops - Machining, Forging, Houses
48	Tool and Die Piston Canning Industry	Forgings, Heat Treating, Tool Steels
49	Canning Machines and Equipment	Foundries, Machining, Metal Fabrication Mill Supply House
50	Food Processing Equipment for Fruits and Vegetables	Foundries, Machining, Warehousing
51	Citrus Fruit Packing Equipment, Chemicals, Waxes, Industrial Fabrication	Forging and Casting
52	Machinery, Coil Line, Classifying Line	Heat Treating, Roll Grinding
53	Acoustical Panels	-
54	Automative, Aerospace, Industrial Products	-
55	Marking Equipment for Industry	Castings
56	Service Industry - Install Machinery	-

(Continued)

Appendix 17 (Continued)

Company	Major End Products	Outside Supporting Service Required
57	Cleaning, Sanitation, Metal Treating Chemicals	-
58	Vibrating Feeders, Conveyors, Processing and Drying, Cooling, Blending	Machining, Power Transmission Components
59	Fiberglass Serving Counters, Dispensers, Salad Green Dryers	Spinnings, Plating, Die Castings, Plastic Extrusions, Vacuum Formed Plastics, Investment Castings

Source: A Survey Conducted by Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology in 1977.

Appendix 18

FOOD PRODUCTS MACHINERY INDUSTRY
MODE OF TRANSPORTATION BY TRUCK, RAIL, AND BY AIR
(in percent)

Company	Major End Products	In Shipments			Out Shipments		
		Truck	Rail	Air	Truck	Rail	Air
1	Plastic Film, Machinery, and Plastic Bags	20	80	-	100	-	-
2	Food Processing Equipment, Material Handling Equipment	100	-	-	100	-	-
3	Food Processing Conveyors	98	-	-	98	-	-
4	Mechanical Components for Conveying	100	-	-	80	-	-
5	Material Handling Equipment, Pickle Harvesters	100	-	-	100	-	-
6	Corrugated Shipping Containers	5	95	-	97	3	-
7	Package Casers	100	-	-	100	-	-
8	Bin Harvesters, Tote Boxes	100	-	-	100	-	-
9	Slip-Torque Conveyors, Swinger Pattern Formers	100	-	-	100	-	-
10	Palletizers, Depalletizers, Conveying Systems, Material Handling Devices	100	-	-	100	-	-
11	Bucket Elevators, Belt Conveyors	100	-	-	100	-	-
12	Conveyors, Food Container Handling Equipment	90	-	10	90	-	10
13	Imprinting, Coding, Marking, and Printing Machinery	80	-	-	80	-	-
14	Carton Forming Machinery, Carton Labeling and Sealing Machinery	100	-	-	100	-	-
15	Glass Forming Machinery, Margarine Packaging Machinery	100	-	-	90	10	-
16	Meat Processing Equipment - Saws, Mixers, Grinders, Choppers, Flakers	100	-	-	100	-	-
17	Food Processing Equipment	100	-	-	-	-	-

(Continued)

Appendix 18 (Continued)

Company	Major End Products	In Shipments			Out Shipments		
		Truck	Rail	Air	Truck	Rail	Air
18	Stainless Steel Processing Equipment	100	-	-	100	-	-
19	Food Processing Machineries	100	-	-	-	-	-
20	Size Reduction Equipment	-	-	-	40	-	60
21	Food Processing Machinery	100	-	-	-	-	100*
22	Food Processing Equipment	90	10	-	100	-	-
23	Motionless Mixers	100	-	-	100	-	-
24	Stainless Steel Tanks	50	50	-	50	50	-
25	Tanks, Processors	98	2	-	90	10	-
26	Clarifiers, Filters, Separators	100	-	-	100	-	-
27	Tanks and Pressure Vessels, Aseptic Systems	X	X	-	X	X	-
28	Heat Exchangers, Evaporators, Distillation	-	-	-	100	-	-
29	Water Heaters	100	-	-	100	-	-
30	Centrifugal Compressors, Blowers and Pumps	90	-	-	-	-	-
31	Rotary Positive Displacement Pumps, Blenders, Cotton Mills	100	-	-	100	-	-
32	Industrial Control Devices	90	-	-	100	-	-
33	Electrical Enclosures, Insect Electrocution Units, Barn Equipment	100	-	-	100	-	-
34	Electronic/Optical Inspection Machinery, Electronic Instruments	90	-	10	60	-	40
35	Process Instrumentation and Computers	-	-	-	-	-	-
36	Temperature and Pressure Instrumentation and Control	100	-	-	98	-	-
37	Bottle Washers, Case Packers	100	-	-	75	25	-

* Shipment by water instead of air. X - Unknown percent.

(Continued)

Appendix 18 (Continued)

Company	Major End Products	In Shipments			Out Shipments		
		Truck	Rail	Air	Truck	Rail	Air
38	Packaging Machinery	100	-	-	100	-	-
39	Bottle Labeling, Mixers, Fillers	100	-	-	100	-	-
40	Bottles, Poly-Film Containers, Injection Molded Parts, Bag in Box Container	10	90	-	95	5	-
41	Glass Containers, Closures	10	90	-	90	10	-
42	Salt Dispensing Equipment, Brine Makers, Electrolytic Hypochlorite Generators	-	-	-	-	-	-
43	Salt, Brine Control Systems, Salt Dissolver Systems	-	-	-	-	-	-
44	Can Tooling	10	-	-	99	-	-
45	Can Manufacturing Equipment	-	-	-	-	-	-
46	Can Manufacturing Equipment	100	-	-	100	-	-
47	Tool and Piston Canning Industry	-	-	-	-	-	-
48	Tool and Die Piston Canning Industry	100	-	-	20	-	-
49	Canning Machines and Equipment	100	-	-	90	-	-
50	Food Processing Equipment for Fruits and Vegetables	75	-	-	75	-	-
51	Citrus Fruit Packing Equipment, Chemicals, Waxes, Industrial Fabrication	99	1	-	100	-	-
52	Machinery, Coil Line, Classifying Line	100	-	-	100	-	-
53	Acoustical Panels	100	-	-	100	-	-
54	Automative, Aerospace, Industrial Products	-	-	-	-	-	-
55	Marking Equipment for Industry	90	10	-	100	-	-
56	Service Industry - Install Machinery	X	X	-	-	-	-

X - Unknown percent.

(Continued)

Appendix 18 (Continued)

Company	Major End Products	In Shipments			Out Shipments		
		Truck	Rail	Air	Truck	Rail	Air
57	Cleaning, Sanitation, Metal Treating Chemicals	75	65	-	85	15	-
58	Vibrating Feeders, Conveyors, Processing and Drying, Cooling, Blending	99	1	-	99	1	-
59	Fiberglass Serving Counters, Dispensers, Salad Green Dryers	90	10	-	95	5	-

Source: A Survey Conducted by Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology in 1977.

Appendix 19

FOOD PRODUCTS MACHINERY INDUSTRY
MODE OF TRANSPORTATION AND AVERAGE DISTANCE IN MILES

Company	Major End Products	In Shipments			Out Shipments		
		Truck	Rail	Air	Truck	Rail	Air
1	Plastic Film, Machinery, and Plastic Bags	300	100	-	700	-	-
2	Food Processing Equipment, Material Handling	70	-	-	150	-	-
3	Food Processing Conveyors	-	-		-	-	-
4	Mechanical Components for Conveying	300	-	-	500	-	-
5	Material Handling Equipment, Pickle Harvesters	350	-	-	-	-	-
6	Corrugated Shipping Containers	25	500	-	90	500	-
7	Package Casers	-	-	-	2,500	-	-
8	Bin Harvesters, Tote Boxes	100	-	-	1,000	-	-
9	Slip-Torque Conveyors, Swinger Pattern Formers	-	-	-	-	-	-
10	Palletizers, Depalletizers, Conveying Systems, Material Handling Devices	-	-	-	1,400	-	-
11	Bucket Elevators, Belt Conveyors	300	-	-	1,000	-	-
12	Conveyors, Food Container Handling Equipment	1,000	-	1,000	-	-	700
13	Imprinting, Coding, Marking, and Printing Machinery	300	-	-	-	-	-
14	Carton Forming Machinery, Carton Labeling and Sealing Machinery	400	-	-	800	-	-
15	Glass Forming Machinery, Margarine Packaging Machinery	350	-	-	500	500	-
16	Meat Processing Equipment - Saws, Mixers, Grinders, Choppers, Flakers	50	-	-	1,500	-	-
17	Food Processing Equipment	-	-	-	-	-	-
18	Stainless Steel Processing Equipment	-	-	-	-	-	-

(Continued)

Appendix 19 (Continued)

Company	Major End Products	In Shipments			Out Shipments		
		Truck	Rail	Air	Truck	Rail	Air
19	Food Processing Machineries	1,000	-	-	1,000	-	-
20	Size Reduction Equipment	-	-	-	-	-	-
21	Food Processing Machinery	-	-	-	-	-	-
22	Food Processing Equipment	100	-	-	500	-	-
23	Motionless Mixers	60	-	-	2,000	-	-
24	Stainless Steel Tanks	800	800	-	800	800	-
25	Tanks, Processors	400	800		800	1,200	-
26	Clarifiers, Filters, Separators	500	500	-	1,000	1,000	-
27	Tanks and Pressure Vessels, Aseptic Systems	-	-	-	-	-	-
28	Heat Exchangers, Evaporators, Distillation	-	-	-	-	-	-
29	Water Heaters	100			*		
30	Centrifugal Compressors, Blowers and Pumps	-	-	-	-	-	-
31	Rotary Positive Displacement Pumps, Blenders, Cotton Mills	-	-	-	-	-	-
32	Industrial Control Devices	20	-	-	2,000	-	-
33	Electrical Enclosures, Insect Electrocution Units, Barn Equipment	-	-	-	-	-	-
34	Electronic/Optical Inspection Machinery, Electronic Instruments	30	-	-	1,500	-	-
35	Process Instrumentation and Computers	-	-	-	2,000	-	-
36	Temperature and Pressure Instrumentation and Control	100	-	-	2,000	-	-
37	Bottle Washers, Case Packers	500	-	-	600	1,100	
38	Packaging Machinery	100	-	-	1,500	-	-

(Continued)

Appendix 19 (Continued)

Company	Major End Products	In Shipments			Out Shipments		
		Truck	Rail	Air	Truck	Rail	Air
39	Bottle Labeling, Mixers, Fillers	-	-	-	-	-	-
40	Bottles, Poly-Film Containers, Injection Molded Parts, Bag in Box Container	150	500	-	200	300	-
41	Glass Containers, Closures	-	600	-	100	400	-
42	Salt Dispensing Equipment, Brine Makers, Electrolytic Hypochlorite Generators	-	-	-	-	-	-
43	Salt, Brine Control Systems, Salt Dissolver Systems	-	-	-	-	-	-
44	Can Tooling	30	-	-	800	-	-
45	Can Manufacturing Equipment	-	-	-	-	-	-
46	Can Manufacturing Equipment	200	-	-	-	-	-
47	Tool and Piston Canning Industry	-	-	-	-	-	-
48	Tool and Die Piston Canning Industry	-	-	-	300	-	-
49	Canning Machines and Equipment	-	-	-	-	-	-
50	Food Processing Equipment for Fruits and Vegetables	50	-	-	900		
51	Citrus Fruit Packing Equipment, Chemicals, Waxes, Industrial Fabrication	500	1,000	-	400	-	-
52	Machinery, Coil Line, Classifying Line	-	-	-	600	-	-
53	Acoustical Panels	750	-	-	750	-	-
54	Automative, Aerospace, Industrial Products	-	-	-	-	-	-
55	Marking Equipment for Industry	900	800	-	800	-	-
56	Service Industry - Install Machinery	-	-	-	-	-	-
57	Cleaning, Sanitation, Metal Treating Chemicals	300	400	-	500	1,500	-

(Continued)

Appendix 19 (Continued)

Company	Major End Products	In Shipments			Out Shipments		
		Truck	Rail	Air	Truck	Rail	Air
58	Vibrating Feeders, Conveyors, Processing and Drying, Cooling, Blending	500	750	-	350	700	-
59	Fiberglass Serving Counters, Dispensers, Salad Green Dryers	1,000	1,000	-	800	800	-

Source: A Survey Conducted by Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology in 1977.

Appendix 20-A

STEEL MILL FACILITIES IN THE SEVEN SOUTHEASTERN STATES, 1974

Company	Steel Furnace: Electric No.	Electric 1/	Basic Oxygen No.	Basic Oxygen 1/	Open Hearth No.	Open Hearth 1/	Bessemer No.	Bessemer 1/	Vacuum Arc No.	Vacuum Arc 1/	Intermediate Mills: Bloom No.	Bloom 2/	Billet No.	Billet 2/
Alabama														
Bethlehem Steel														
Connors Steel Co.	2	45												
Formed Tubes, Inc.														
Plymouth Tube Co.														
Republic Steel Corp.	2	185	2	150							1	1,332		
Southern Electric Steel Co.	2	15												
Southern Fabricating Co.														
U. S. Steel Corp.	–	–	–	–	21	380	3	24			3	3,094	2	1,165
Subtotal	6	245	4	350	21	380	3	24			4	4,426	2	1,165
Florida														
ADCOM														
Florida Steel Corp.	6	30												
Mid-States Steel and Wire	–	–												
Subtotal	6	30												
Georgia														
Atlantic Steel Co.	2	85									1	480	1	480
Bekaert Wire Corp.														
Georgia Tubing Corp.														
Tull Allied Metal Products	–	–									–	–	–	–
Subtotal	2	85									1	480	1	480
Mississippi														
Mid-States Steel and Wire														
Mississippi Steel, Magna Corp.	3	35												
Piper Industries														
Southern Precision Steel	–	–												
Subtotal	3	35												
North Carolina														
Florida Steel Co.	2	55							7	9				
Teledyne Allvac														
Walker Manufacturing Co.	–	–							–	–				
Subtotal	2	55							7	9				
South Carolina														
Georgetown Steel Corp.	3	75											1	200
Nucor Corp.	3	32											–	–
Subtotal	6	107											1	200
Tennessee														
Knoxville Iron Co.	3	35												
Piper Industries														
Republic Steel Corp.														
Tennessee Forging Steel Corp.	3	25	–	–	–	–	–	–	–	–	–	–	–	–
Subtotal	6	60												
Total	31	617	4	350	21	380	3	24	7	9	5	4,906	4	1,845

1/ Tons per heat.
2/ Annual rolling capacity in thousands of net tons.

Source: Directory of Iron and Steel Works of the United States and Canada, 1974, American Iron and Steel Institute, New York.

Appendix 20-B

STEEL MILL FACILITIES IN THE SEVEN SOUTHEASTERN STATES, 1974

Company	Finishing Mills																			
	Rod		Bar		Strip		Plate		Sheet		Tin Plate		Structural Shape		Rail		Cotton Tie	
	No.	2/	No.	2/	No.	2/	No.	2/	No.	2/	No.	2/	No.	2/	No.	2/	No.	2/
Alabama																		
Bethlehem Steel																		
Connors Steel Co.																		
Formed Tubes, Inc.																		
Plymouth Tube Co.																		
Republic Steel Corp.					4	2,226	1	510	1	41								
Southern Electric Steel Co.			1	90														
Southern Fabricating Co.																		
U. S. Steel Corp.	1	200	1	177	1	1,600	1	515	5	4,526	3	789	1	261	1	581	1	70
Subtotal	1	200	2	267	5	3,826	2	1,025	6	4,567	3	789	1	261	1	581	1	70
Florida																		
ADCOM																		
Florida Steel Corp.			3	715														
Mid-States Steel and Wire			—	—														
Subtotal			3	715														
Georgia																		
Atlantic Steel Co.	1	250	1	206	2	106												
Bekaert Wire Corp.																		
Georgia Tubing Corp.																		
Tull Allied Metal Products	—	—	—	—	—	—												
Subtotal	1	250	1	206	2	106												
Mississippi																		
Mid-States Steel and Wire																		
Mississippi Steel, Magna Corp.			3	120														
Piper Industries																		
Southern Precision Steel			—	—														
Subtotal			3	120														
North Carolina																		
Florida Steel Co.			2	120														
Teledyne Allvac			4	13														
Walker Manufacturing Co.			—	—														
Subtotal			6	133														
South Carolina																		
Georgetown Steel Corp.			1	200									1					
Nucor Corp.			3	200									—					
Subtotal			4	400									1					
Tennessee																		
Knoxville Iron Co.			4	90														
Piper Industries																		
Republic Steel Corp.																		
Tennessee Forging Steel Corp.	—	—	4	120	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal			8	210														
Total	2	450	27	2,051	7	3,932	2	1,025	6	4,567	3	789	2	261	1	581	1	70

2/ Annual rolling capacity in thousands of net tons.

Source: Directory of Iron and Steel Works of the United States and Canada, 1974, American Iron and Steel Institute, New York.

Appendix 20-C

STEEL MILL FACILITIES IN THE SEVEN SOUTHEASTERN STATES, 1974

State and Company	Fabricating Plants							
	Wire No.	Nail No.	Tube No.	Forging No.	Pipe No.	Galvanized Sheet No.	Bolts and Bolts No.	Pre-engineered Buildings No.
Alabama								
Bethlehem Steel							1	
Connors Steel Co.								
Formed Tubes, Inc.			2					
Plymouth Tube Co.			1					
Republic Steel Corp.	1				1	1	1	
Southern Electric Steel Co.			3					
Southern Fabricating Co.			5					
U. S. Steel Corp.	1		—	1	—	—	—	
Subtotal	2		11	1	1	1	2	
Florida								
ADCOM	1							
Florida Steel Corp.								
Mid-States Steel and Wire	1							
Subtotal	2							
Georgia								
Atlantic Steel Co.	1	1	1			1		1
Bekaert Wire Corp.	1							
Georgia Tubing Corp.			1					
Tull Allied Metal Products	—	—	1			—		—
Subtotal	2	1	3			1		1
Mississippi								
Mid-States Steel and Wire	1							
Mississippi Steel, Magna Corp.								
Piper Industries								
Southern Precision Steel	—							
Subtotal	1							
North Carolina								
Florida Steel Co.								
Teledyne Allvac								
Walker Manufacturing Co.			1		1			
Subtotal			1		1			
South Carolina								
Georgetown Steel Corp.								
Nucor Corp.	1	1						
Subtotal	1	1						
Tennessee								
Knoxville Iron Co.				1				
Piper Industries								
Republic Steel Corp.					1			
Tennessee Forging Steel Corp.	—	—	—	—	—	—	—	—
Subtotal				1	1			
Total	8	2	15	2	3	2	2	1

Source: Directory of Iron and Steel Works of the United States and Canada, 1974, American Iron and Steel Institute, New York.

Appendix 21

SPIN COOLER: RAW MATERIALS AND PURCHASED COMPONENTS

Description	Quantity	Albany		Chicago	
		Price Each ($)	Total Price ($)	Price Each ($)	Total Price ($)
12 Gage mild steel	10,384 lbs.	.1851/lb.	1,922.08	.2000/lb.	2,076.80
A36 1" x 1" x ¼" Angle steel	164 lbs.	.1695/lb.	27.80	.1810/lb.	29.68
A36 1½" x 1½" x ¼" Angle steel	1,724 lbs.	.1716/lb.	295.84	.1795/lb.	309.46
A36 2" x 2" x ¼" Angle steel	448 lbs.	.1716/lb.	76.88	.1790/lb.	80.19
A36 3" x 3" x ¼" Angle steel	37 lbs.	.1716/lb.	6.35	.1790/lb.	6.62
3/4" x 2" flat bar steel	½ lb.	.1593/lb.	.07	.1715/lb.	.08
½" Stainless #304 round steel (threaded)	172 lbs.	1.92/lb.	330.24	2.05/lb.	352.60
1" Stainless #304 round steel	247 lbs.	1.74/lb.	429.78	1.92/lb.	474.24
2" Stainless #304 round steel	486 lbs.	1.60/lb.	777.60	1.67/lb.	811.62
3/4" Stainless #304 half round steel	372 lbs.	2.18/lb.	810.96	1.95/lb.	725.40
Erving Grading Belt - Type V 7 7/16" width x 3/4" thick	272 $ft.^2$	5.60/$ft.^2$	1,523.20	5.60/ft.	1,523.20
6" x 6" sch 40 pipe nipple galvanized	1	9.79	9.79	9.79	9.79
6" cap galvanized	1	20.30	20.30	20.30	20.30
½" brass nut NC	220	.284	62.48	.284	62.48
½" flat brass washers	220	.114	25.08	.114	25.08
3" pipe sch 40 galvanized	4,725 ft.	2.04/ft.	9,639.00	2.25/ft.	10,631.25
tee 3" x 3" x 3" brass	8	24.24	193.92	24.24	193.92
3" close nipple	60	2.67	160.20	2.67	160.20
Subtotal			16,318.57		17,492.91

(Carried Forward)

Appendix 21 (Continued)

Description	Quantity	Albany Price Each ($)	Albany Total Price ($)	Chicago Price Each ($)	Chicago Total Price ($)
(Brought Forward)			16,318.57		17,492.91
3" Gate valve 150 PSI	8	95.44	763.52	95.44	763.52
Reducer 3" to 1½" galvanized	8	1.96	15.68	1.96	15.68
tee 1½" x 1½" x 1½" galvanized	8	1.79	14.32	1.79	14.32
Cap 3" galvanized	2	1.14	2.28	1.14	2.28
90° elbow 2" galvanized	2	2.21	4.42	2.21	4.42
3" - 2" reducer galvanized	1	1.91	1.91	1.91	1.91
3" galvanized union	4	4.57	18.28	4.57	18.28
Four-ply transmission type rubber over polyester 60" wide belting	117 ft.	15.56/ft.	1,820.52	15.56/ft.	1,820.52
Berkley pump 2½" input, 2½" output	1	139.16	139.16	139.16	139.16
with 4 HP, 230/460 V Baldour motor	1	118.20	118.20	118.20	118.20
7½ HP 1750 RPM Main Drive Motor	1	136.80	136.80	136.80	136.80
60" wide 24" diameter sch 40 pipe	1	120.94	120.94	184.45	184.45
66" wide 6" diameter sch 40 pipe	2	24.15	48.30	35.48	70.96
2" wide rough top lagging belting for drum	4,522 ft.	.58/ft.	1,311.26	.58/ft.	1,311.26
Hi-Lo base Gerbling 215T & companion sheave	1	362.20	362.20	362.20	362.20
48 tooth sprocket face pulley RC 100	1	55.39	55.39	55.39	55.39
84 tooth sprocket face pulley RC 100	1	113.44	113.44	113.44	113.44
RC 100 Chain	10 ft.	4.67/ft.	46.70	4.67/ft.	46.70
Subtotal			21,042.69		22,672.44

(Carried Forward)

Appendix 21 (Continued)

Description	Quantity	Albany		Chicago	
		Price Each ($)	Total Price ($)	Price Each ($)	Total Price ($)
(Brought Forward)			21,042.69		22,672.44
1 11/16" diameter SCM take-up wide slot bearing - Dodge bearings	2	19.57	39.14	19.57	39.14
2" SCM pillow block - Dodge bearings	8	23.40	187.20	23.40	187.20
2" series K pillow block - self	2	55.50	111.00	55.50	111.00
Total			21,380.03		23,009.78

Appendix 22

PASTEURIZER/COOLER: RAW MATERIALS AND PURCHASED COMPONENTS

Description	Quantity	Albany		Chicago	
		Price Each ($)	Total Price ($)	Price Each ($)	Total Price ($)
3 15/16" Round stock cold rolled steel	407.1 lbs.	.389/lb.	158.36	.396/lb.	161.21
4 7/16" Round stock cold rolled steel	499.5 lbs.	.405/lb.	202.29	.396/lb.	197.80
2 3/16" Round stock cold rolled steel	184.8 lbs.	.378/lb.	69.85	.385/lb.	71.14
2 15/16" Round stock cold rolled steel	175.4 lbs.	.389/lb.	68.23	.385/lb.	67.33
¼" Stainless steel round	1.2 lbs.	1.90/lb.	2.28	2.03/lb.	2.44
½" Stainless steel round	25.4 lbs.	1.90/lb.	48.26	2.04/lb.	51.82
3/8" Stainless steel round	2.9 lbs.	1.90/lb.	5.51	2.03/lb.	5.89
3/4" Stainless steel round	68.4 lbs.	1.90/lb.	129.96	2.03/lb.	138.85
¼" x 1½" Flat bar stainless steel	11.2 lbs.	1.55/lb.	17.36	2.23/lb.	24.98
¼" x 3½" Flat bar stainless steel	6.95 lbs.	1.55/lb.	10.77	2.23/lb.	15.50
¼" x 3" Flat bar stainless steel	15.3 lbs.	1.55/lb.	23.72	2.23/lb.	34.12
3/8" x 2" Flat bar stainless steel	12.75 lbs.	1.55/lb.	19.76	2.23/lb.	28.43
3/8" x 3" Flat bar stainless steel	10.85 lbs.	1.55/lb.	16.82	2.23/lb.	24.20
3/8" x 4" Flat bar stainless steel	51 lbs.	1.55/lb.	79.05	2.23/lb.	113.73
3/8" x 5" Flat bar stainless steel	63.8 lbs.	1.55/lb.	98.89	2.23/lb.	142.27
½" x 1½" Flat bar stainless steel	1.7 lbs.	1.55/lb.	2.64	2.21/lb.	3.76
½" x 2" Flat bar stainless steel	9.5 lbs.	1.55/lb.	14.73	2.21/lb.	21.00
5/6" x 1½" Flat bar stainless steel	21.27 lbs.	1.55/lb.	32.97	2.21/lb.	47.01
1/8" x 2" Flat bar stainless steel	10.65 lbs.	1.55/lb.	16.51	2.21/lb.	23.54
1" Plate stainless steel	496.1 lbs.	1.15/lb.	570.52	1.63/lb.	808.64
3/4" Plate stainless steel	64.61 lbs.	1.15/lb.	74.30	1.63/lb.	105.31
3/16" Plate Stainless Steel	2.95 lbs.	1.15/lb.	3.39	1.63/lb.	4.81
¼" Plate stainless steel	.75 lbs.	1.15/lb.	.86	1.63/lb.	1.22
1" x 1" x 1/8" Angle stainless steel	268.79 lbs.	1.48/lb.	397.81	1.82/lb.	489.20
½" x ½" x 3/16" Angle stainless steel	14.66 lbs.	1.48/lb.	21.70	1.82/lb.	26.68
2" x 2" x 3/16" Angle stainless steel	1,308.59 lbs.	1.48/lb.	1,936.71	1.82/lb.	2,381.68
2" x 2" x ¼" Angle stainless steel	5,556.98 lbs.	1.48/lb.	8,224.33	1.82/lb.	10,113.70
2½" x 2½" x ¼" Angle stainless steel	43.05 lbs.	1.48/lb.	63.71	1.82/lb.	78.35
3" x 3" x ¼" Angle stainless steel	971.43 lbs.	1.48/lb.	1,437.72	1.82/lb.	1,768.00
4" x 4" x 3/8" Angle stainless steel	81.46 lbs.	1.48/lb.	120.56	1.82/lb.	148.25
Subtotal			13,869.57		16,556.37

(Continued)

Appendix 22 (Continued)

Description	Quantity	Albany Price Each ($)	Albany Total Price ($)	Chicago Price Each ($)	Chicago Total Price ($)
16 gage sheet stainless steel	1,747.13 lbs.	1.04/lb.	1,817.03	1.59/lb.	2,777.94
12 gage sheet stainless steel	4,724.28 lbs.	1.04/lb.	4,913.24	1.59/lb.	7,511.61
10 gage sheet stainless steel	162.39 lbs.	1.04/lb.	168.89	1.59/lb.	258.20
1½" SCH 40 Red brass pipes	366.15 ft.	7.65/ft.	2,801.05	7.38/ft.	2,702.18
3" SCH 40 Red brass pipes	128 ft.	20.65/ft.	2,643.20	19.18/ft.	2,455.04
1" SCH 40 Red brass pipes	667.4 ft.	4.40/ft.	2,936.56	4.27/ft.	2,849.80
3" SCH 40 Stainless pipes	2.5 ft.	20.00/ft.	50.00	19.76/ft.	49.90
3" SCH 10 Stainless pipes	604 ft.	6.10/ft.	3,684.40	6.25/ft.	3,775.00
4" SCH 10 Stainless pipes	1.22 ft.	9.18/ft.	11.20	8.12/ft.	9.91
2½" SCH 40 galvanized pipes	6 ft.	2.33/ft.	13.98	2.33/ft.	13.98
2" SCH 40 galvanized pipes	6 ft.	1.54/ft.	9.24	1.54/ft.	9.24
1½" SCH 40 galvanized pipes	2 ft.	1.13/ft.	2.26	1.13/ft.	2.26
1¼" SCH 40 galvanized pipes	2 ft.	.95/ft.	1.90	.95/ft.	1.90
(Pipe Fittings)					
Pipe caps 1" brass	86	1.23	105.78	1.23	105.78
Pipe caps 3" brass	14	12.12	169.68	12.12	169.68
Flange 3" brass	1	35.53	35.53	35.53	35.53
Flange 4" brass	3	50.74	152.22	50.74	152.22
T 1½" brass 125-lb. rating	6	5.13	30.78	5.13	30.78
T 1½" x 1" x ½" brass	1	6.53	6.53	6.53	6.53
Reducing bushing 3" to 1½" brass	1	11.19	11.19	11.19	11.19
Reducing bushing 1½" to 1" brass	6	2.14	12.84	2.14	12.84
1½" union brass bushing	11	7.27	79.97	7.27	79.97
2½" union galvanized bushing	12	7.70	92.40	7.70	92.40
2" union galvanized bushing	12	3.78	45.36	3.78	45.36
1½" union galvanized bushing	4	3.04	12.16	3.04	12.16
1¼" union galvanized bushing	4	2.48	9.92	2.48	9.92
1" union galvanized bushing	42	1.82	76.44	1.82	76.44
Globe valve 1½" bronze or brass	2	21.92	43.84	21.92	43.84
Globe valve 1" bronze	13	11.57	150.41	11.57	150.41
Whirl-jet ¼ B10 nozzles Spray Systems, Inc.	24	1.69	40.56	1.69	40.56
Nipples 1½" close brass	12	1.99	23.88	1.99	23.88
Nipples 3" x 5" brass	6	17.93	107.58	17.93	107.58
Tee 3" brass 125 rating	6	24.24	145.44	24.24	145.44
Subtotal			20,405.46		23,719.47

(Continued)

Appendix 22 (Continued)

Description	Quantity	Albany Price Each ($)	Albany Total Price ($)	Chicago Price Each ($)	Chicago Total Price ($)
(Pipe Fittings - Continued)					
Gasket Rubtatex door seal	65 ft.	1.09/ft.	70.85	1.09/ft.	70.85
Gasked Red River 3/4" x 11/16"	135 ft.	1.26/ft.	170.10	1.26/ft.	170.10
Flange 2½" galvanized	3	6.33	18.99	6.33	18.99
Flange 2" galvanized	3	5.72	17.16	5.72	17.16
Flange 1½" galvanized	1	5.59	5.59	5.59	5.59
Flange 1¼" galvanized	1	5.01	5.01	5.01	5.01
2½" elbow 90° galvanized	6	5.67	30.42	5.67	30.42
2" elbow 90° galvanized	6	2.38	14.28	2.38	14.28
1½" elbow 90° galvanized	4	1.64	6.56	1.64	6.56
1½" elbow 90° galvanized	4	1.25	5.00	1.25	5.00
1½" T galvanized	6	2.38	14.28	2.38	14.28
2" pipe plugs galvanized	3	1.65	4.95	1.65	4.95
1¼" pipe plugs galvanized	3	.89	2.67	.89	2.67
Whirl - jet ¼ B15 brass	525	1.12	588.00	1.12	588.00
(Miscellaneous Hardware)					
1 HP 230/460 V, 3-phase, 60 HTZ frame 182 Baldow	1	90.64	90.64	90.64	90.64
Gear reducer model 10 CTD 500 to 1 LV - MR Windsmith	1	1,166.63	1,166.63	1,166.63	1,166.63
Variable pitch pulley model 74 - 7/8" bore Gerbling	1	59.40	59.40	59.40	59.40
Companion shoe LS - 90 with 3/4" JB bushing	1	99.67	99.67	99.67	99.67
Belt #145 45.4" pitch length Gerbling	1	47.20	47.20	47.20	47.20
Belt guard fabricated in plant					
one from drive motor to gear box	1	30.00	30.00	36.00	36.00
one from gear box to jack shaft	1	45.00	45.00	54.00	54.00
Hi-Lo gase Gerbling model #145	1	58.21	58.21	58.21	58.21
5 Hp pump 2½ " x 2" Centril model 200 5" impeller 3450 RPM (Tecumseh) with Baldour 3706 motor	3	325.07	975.21	325.07	975.21
Subtotal			3,525.82		3,525.82

(Continued)

Appendix 22 (Continued)

Description	Quantity	Albany Price Each ($)	Albany Total Price ($)	Chicago Price Each ($)	Chicago Total Price ($)
Model 30 2½ screwed filter with perforated basket - Haywood	3	225.00	675.00	225.00	675.00
Model 30 1½" screwed filter with perforated basked - Haywood	1	210.00	210.00	210.00	210.00
Penberthy 1¼" #HLM - 1¼" nozzle for direct steam injection tempering	1	82.35	82.35	82.35	82.35
Powers model 11 regulator 3/4" steam 150 PSI 220°F	1	307.80	307.80	307.80	307.80
Taylor #2004 V512231 - 1½" valve with ducted iron body air to open	3	357.40	1,072.20	357.40	1,072.20
Hoffman 1½" steam trap #582	3	92.70	278.10	92.70	278.10
Bronze 1" steam strainers	3	59.54	178.62	59.54	178.62
Check valve 1½"	4	41.04	164.16	41.04	164.16
Belt 8' wide mfg. Ashworth service D4 (3/8" x 96" flat wire)	157				
Thumb screws 3/8" x 3/4" N.C. (Zinc Plated)	112	.27	30.24	.27	30.24
24" extra heavy duty pipe 97" long schedule 120 Rollers (drive snubber end)	1	303.00/ft.	2,449.15	343.62/ft.	2,749.00
8" extra heavy duty pipe 96" long Rollers (drive snubber end)	1	27.73/ft.	221.84	293.16/ft.	293.16
6" extra heavy duty pipe 96 3/4" long schedule 120 - Rollers (drive snubber end) - machined pipe steel	2	15.00/ft.	124.50	18.87/ft.	167.96
3½ O.D. x 49/64 I.D. 3/16" flat stainless washer by Whitehead Stamping Company	150	.673	100.95	.673	100.95
Blower 7½ H.P. American Blower Co. Rated at 3500 RPM	1	614.00	614.00	614.00	614.00
Single Taylor 122 RM temp. recording controller with 5' 304 stainless	1	1,516.00	1,516.00	1,516.00	1,516.00
Dual Taylor capillary and bulb 304 stainless	1	1,750.00	1,750.00	1,750.00	1,750.00
Subtotal			9,773.91		10,188.54

(Continued)

Appendix 22 (Continued)

Description	Quantity	Albany Price Each ($)	Albany Total Price ($)	Chicago Price Each ($)	Chicago Total Price ($)
(Bearings)					
3/4' pillow block class 3L-EC - Dodge	20	10.06	212.00	10.06	212.00
1 15/16" pillow block type E - Dodge	2	55.70	111.40	55.70	111.40
2 3/16" pillow block type E - Dodge	2	62.48	124.96	62.48	124.96
3 15/16" pillow block type E - Dodge	2	230.81	461.62	230.81	461.62
4 7/16" pillow block type E - Dodge	2	378.85	757.70	378.85	757.70
1 15/16" type E slotted for take up - Dodge	2	63.22	126.44	63.22	126.44
Paramount No. PR220W	32				
3/4" thick manufacturers nylatron 3/4" I.D. x 1½ O.D. slotted	162	.285	46.17	.285	46.17
(Bolts)					
3/8" x 1½" cadmium plated N.C.	235	.736	172.96	.736	172.96
3/8" x 1" cadmium plated N.C.	178	.455	80.99	.455	80.99
¼" x 1" cadmium plated N.C.	56	.330	18.48	.330	18.48
5/8" x 2 3/4" cadmium plated N.C.	4	.3532	1.41	.3532	1.41
5/8" x 3¼" cadmium plated N.C.	8	.4303	3.44	.4303	3.44
5/8" x 3" cadmium plated N.C.	80	.3776	30.20	.3776	30.20
5/8" x 3½" cadmium plated N.C.	120	.4303	51.64	.4303	51.64
3/4" x 2½" cadmium plated N.C.	4	.5237	2.09	.5237	2.09
3/4" x 4" cadmium plated N.C.	8	.7356	5.88	.7356	5.88
3/4" x 4½" cadmium plated N.C.	8	.8064	6.45	.8064	6.45
(Nuts)					
3/4" jam type	36	.1748	6.29	.1748	6.29
1" hex	4	.7410	2.96	.7410	2.96
1" jam	2	.5189	1.04	.5189	1.04
3/8" hex	112	.413	46.25	.413	46.25
½" x 2" set screws square head	4	.1782	7.13	.1782	7.13
Redi bolt - 3/4" National cord	9 ft.	.574/ft.	5.16	.574/ft.	5.16
1" Redi bolt N.C.	2 ft.	1.03/ft.	2.06	1.03/ft.	2.06
Nylon washer 3/4" I.D. 1 3/8 O.D. 1/8" Thick	132	.066	8.71	.066	8.71
Roll pins for 1" shaft	2	.23	.46	.23	.46
Subtotal			2,424.45		2,424.45
Total			49,999.21		56,414.65